

From: Whittaker, Laura [laura.whittaker@aptim.com]
Sent: Wednesday, September 19, 2018 4:12 AM
To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]
CC: Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Fowler, Janet CIV NAVSEA, SEA 04N [janet.fowler1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Amy Mangel [amy.mangel@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]
Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY D4 (DC)
Attachments: HPNS APTIM RSY D4 (DC) Soil Non-LLRW Concurrence Request 09192018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.

LAURA WHITTAKER
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Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

Contract No. EMAC III CTO-0013					
RSY Pad: D4	RSY Pad Use Number: Deconstruction (DC)	First Submittal <input checked="" type="checkbox"/>	Second Submittal <input type="checkbox"/>		
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 09/19/2018			

Soil Sample Data					
Sample Identification	Survey Location	Type of Sample	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
		Upper limit of site reference background	1.633	0.113	0.331
PE2-RSYD4-DC-S001	1	Systematic	0.927	0.0215	0.000
PE2-RSYD4-DC-S002	2	Systematic	0.477	-0.0500	N/A
PE2-RSYD4-DC-S003	3	Systematic	0.641	0.00368	N/A
PE2-RSYD4-DC-S004	4	Systematic	0.996	0.00734	N/A
PE2-RSYD4-DC-S005	5	Systematic	0.736	-0.0577	N/A
PE2-RSYD4-DC-S006	6	Systematic	0.627	-0.0173	N/A
PE2-RSYD4-DC-S007	7	Systematic	0.945	-0.0549	N/A
PE2-RSYD4-DC-S008	8	Systematic	0.558	-0.0251	N/A
PE2-RSYD4-DC-S009	9	Systematic	0.598	0.0391	N/A
PE2-RSYD4-DC-S010	10	Systematic	0.692	0.0182	N/A
PE2-RSYD4-DC-S011	11	Systematic	0.723	0.000939	0.0608
PE2-RSYD4-DC-S012	12	Systematic	0.671	0.00638	N/A
PE2-RSYD4-DC-S013	13	Systematic	0.694	0.0234	N/A
PE2-RSYD4-DC-S014	14	Systematic	0.865	-0.0104	N/A
PE2-RSYD4-DC-S015	15	Systematic	0.752	-0.00045	N/A
PE2-RSYD4-DC-S016	16	Systematic	0.730	-0.0511	N/A
PE2-RSYD4-DC-S017	17	Systematic	0.795	0.0140	N/A
PE2-RSYD4-DC-S018	18	Systematic	0.734	0.0239	N/A
Biased Soil Sample Data					
PE2-RSYD4-DC-B-S001	1	Biased	0.741	0.000	N/A
PE2-RSYD4-DC-B-S002	2	Biased	0.690	0.000611	N/A
PE2-RSYD4-DC-B-S003	3	Biased	0.843	0.0184	N/A
PE2-RSYD4-DC-B-S004	4	Biased	0.775	-0.00814	N/A
PE2-RSYD4-DC-B-S005	5	Biased	0.495	-0.0857	N/A
PE2-RSYD4-DC-B-S006	6	Biased	0.685	0.000379	N/A
PE2-RSYD4-DC-B-S007	7	Biased	0.647	0.0110	N/A
PE2-RSYD4-DC-B-S008	8	Biased	0.725	0.0260	N/A

²²⁶Ra Radium-226¹³⁷Cs Cesium-137

Sr Strontium

pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-07312018-PE2-ROV2-2857	07/31/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,842 CPS	3,437-5,229* CPS
RSI Follow-up Static Survey	HPRS-08072018-PE2-JSS2-2890	08/07/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	3,768-5,100* CPS
Systematic Sample Survey	HPRS-07272018-PE2-JSS-2852	07/27/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	15,282-21,155* CPM
Biased Sample Survey	HPRS-08092018-PE2-JSS-2903	08/09/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	20,809-21,874* CPM

+ Gamma readings exceeding the Reference Area 3σ IL are attributable to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil—see Note(s) in the Summary table (page 2) for more details.

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—33 locations identified during the data review process were investigated. 23 follow-up locations exceeded the Reference Area static IL for regions of interests (ROIs) 6, 7, and/or 8 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).
Note: Gamma readings reported in the Instrument and Survey Data table (page 1) for the gamma walkover and follow-up static surveys show the mean gamma gross count rate range (ROI 10, VD1) for all surveyed follow-up locations. Spectral analysis results show 23 follow-up locations exceeded the Reference Area Static IL for regions of interests (ROI) 6, 7, and/or 8. Biased samples were collected at eight representative locations to support the evaluation of the elevated gamma readings.
Biased soil samples PE2-RSYD4-DC-B-S001-PE2-RSYD4-DC-B-S008 were collected at follow-up locations 8, 20, 23, 24, 25, 31, 32, and 33, and submitted for gamma spectroscopy analysis to further characterize the elevated soil readings (see Summary Note 4 below).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 45-68).
Ten percent of the systematic soil samples (two samples in total, PE2-RSYD4-DC-S001 & PE2-RSYD4-DC-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 45-68).
4) Biased sample survey—samples PE2-RSYD4-DC-B-S001-PE2-RSYD4-DC-B-S008 were obtained and analyzed to support the evaluation of eight representative elevated gamma readings collected at follow-up locations 8, 20, 23, 24, 25, 31, 32, and 33. Biased soil sample location are shown on the Biased Sample Survey map (page 9). TestAmerica sample results are attached (pages 69-84).
Note: Static gamma measurements collected at systematic and biased sample locations were obtained with a handheld Ludlum 2221 Scaler/Ratemeter and 3"x3" NaI probe; the results show gamma readings exceeding the instrument-specific Reference Area Static IL at several sample locations. Sample results indicate that this activity is due to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil.
Conclusions:
All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 33 locations were investigated during the follow-up static survey, with 23 readings greater than the Reference Area static IL. Biased soil samples were collected at eight representative follow-up locations to support the evaluation of elevated gamma readings. Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-42).
Final analytical results for systematic and biased samples from this RSY pad are concluded to be comparable to background. Histograms showing systematic soil sample activity concentrations are provided (pages 43-44). Ten percent of the systematic soil samples (two samples in total, PE2-RSYD4-DC-S001 & PE2-RSYD4-DC-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).
This data package characterizes the construction base layer for RSY D4 pad. The soil was initially import clean material.
APTIM request RASO concurrence to release this soil as Non-LLRW.
Disposition: This soil shall be dispositioned as non-LLRW waste. The soil will be stockpiled onsite for reuse following appropriate chemical characterization.

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
 - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ($Z>3$) is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local $Z>3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local $Z>3$ is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
 - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a $Z>3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local $Z>3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local $Z > 3$ is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

LC	=	critical level (counts)
B	=	average background in the ROI

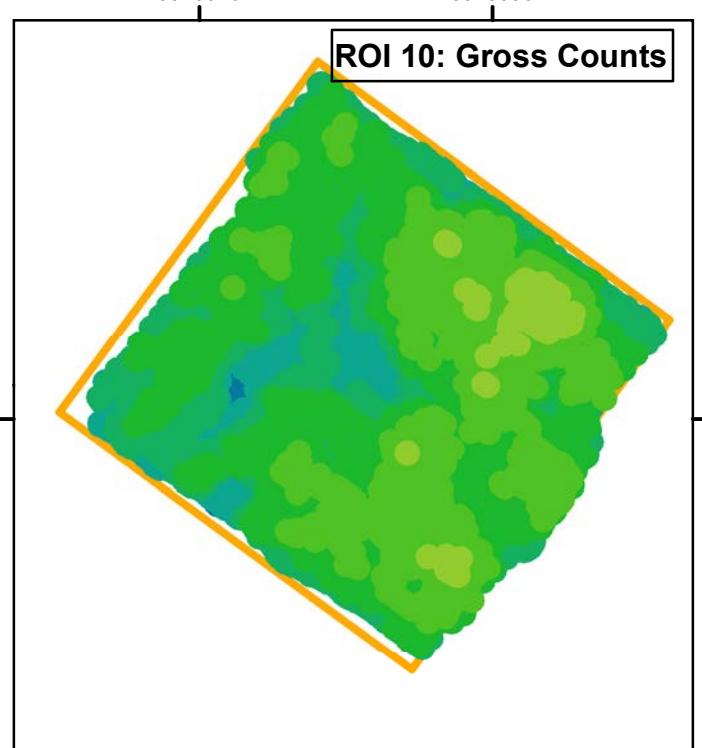
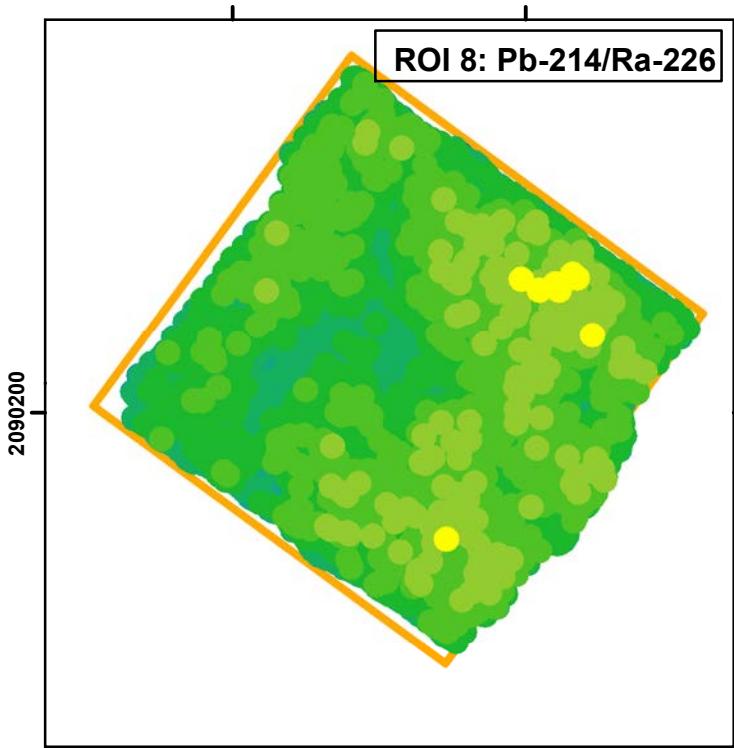
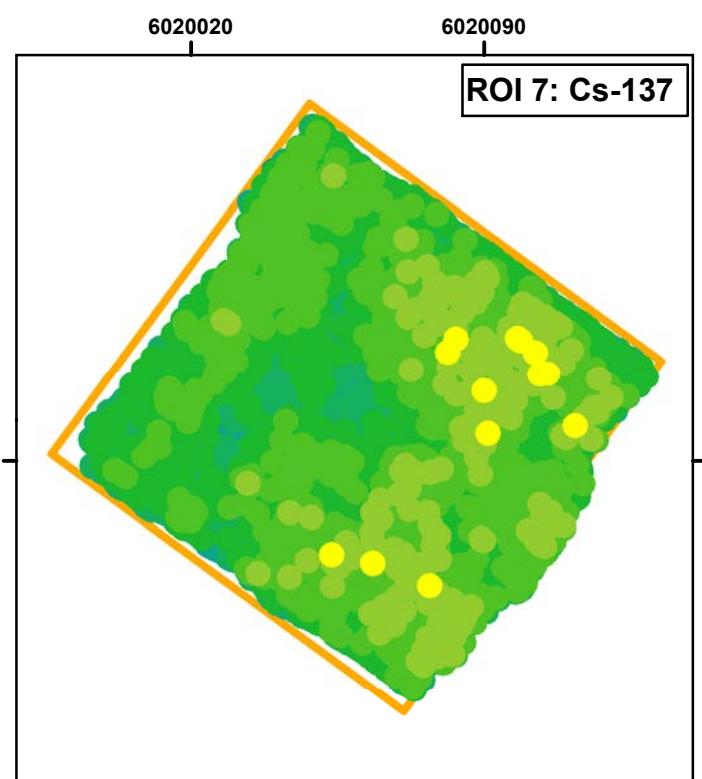
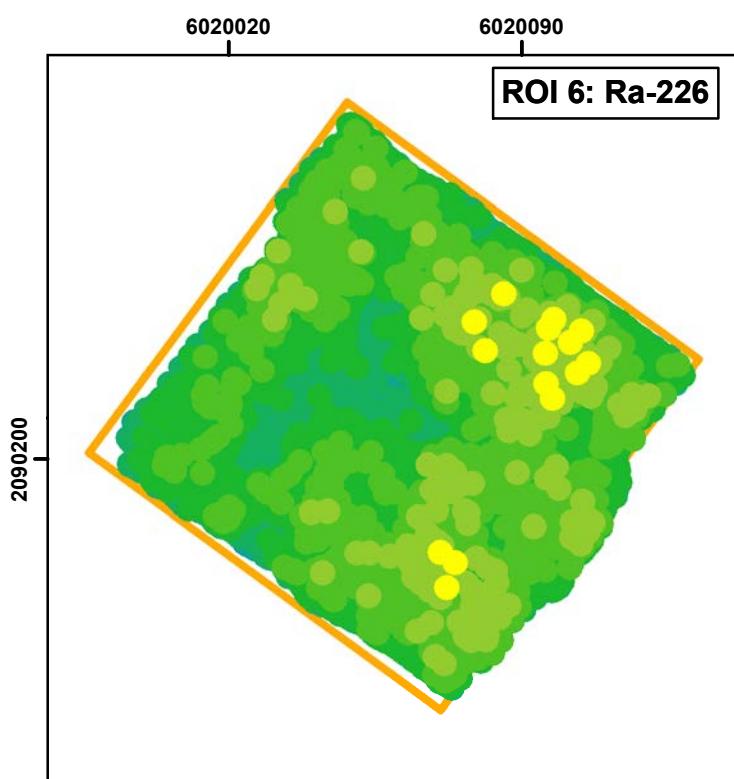
When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

RSI Data Plots
HPNS Parcel E-2
RSY Pad D4 Deconstruction

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Contour Map



RS 700 Gamma Walkover Survey Data (VD1)

- > 3 std dev
 - > -1 to < 0 std dev
 - > 2 to < 3 std dev
 - > -2 to < -1 std dev
 - > 1 to < 2 std dev
 - > -3 to < -2 std dev
 - > 0 to < 1 std dev
 - < -3 std dev
- RSY Pad Boundaries

0 20 40 80 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



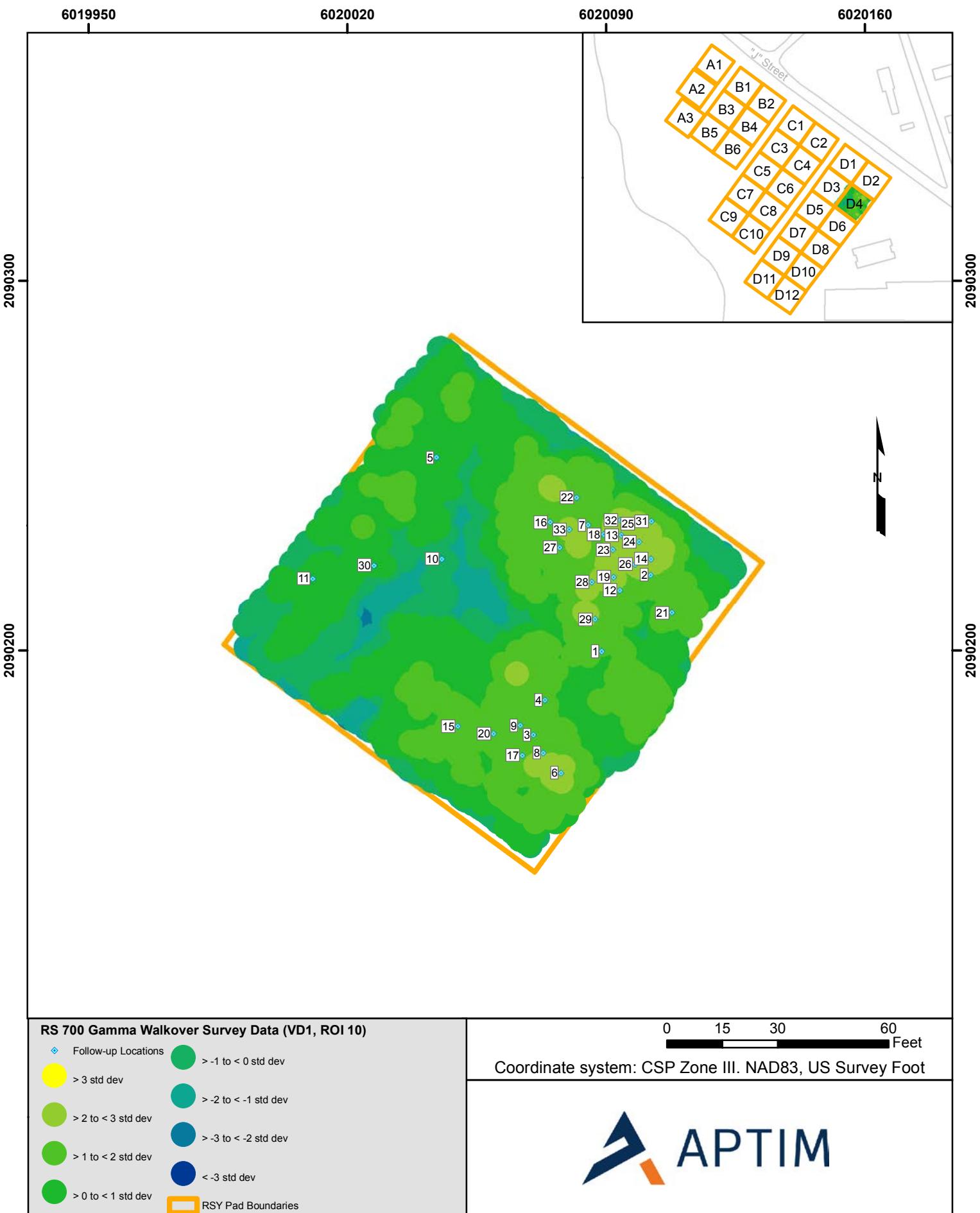
RSI Review Summary

Summary:

33 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on 23 gamma static data locations exceeded the Reference Area Static IL for region of interest (ROIs) 6, 7, and/or 8. All other gamma static readings at follow-up locations were less than the Reference Area static IL for ROIs 3, 6, 7, and 8; figures for all locations are provided on pages 10-42.

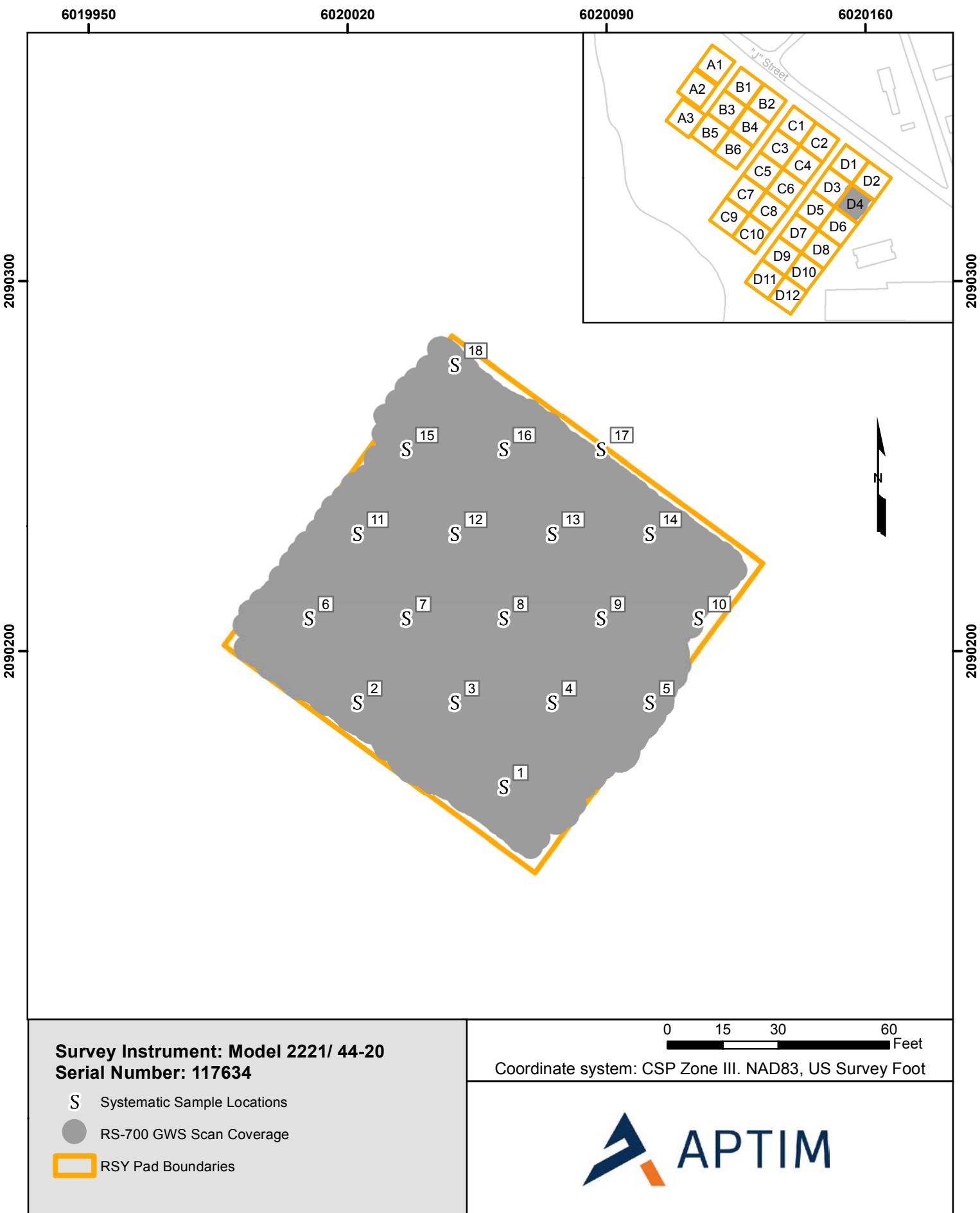
RSI Follow-up Static Survey
HPRS-08072018-PE2-JSS2-2890

HPNS Parcel E-2 RSY Pad D4-DC



Systematic Sample Survey
HPRS-07272018-PE2-JSS-2852

HPNS Parcel E-2 RSY Pad D4-DC



**HPNS Parcel E-2
RSY Pad D4-DC**

Biased Sample Survey
HPRS-08092018-PE2-JSS-2903

6020020

6020090

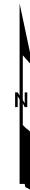
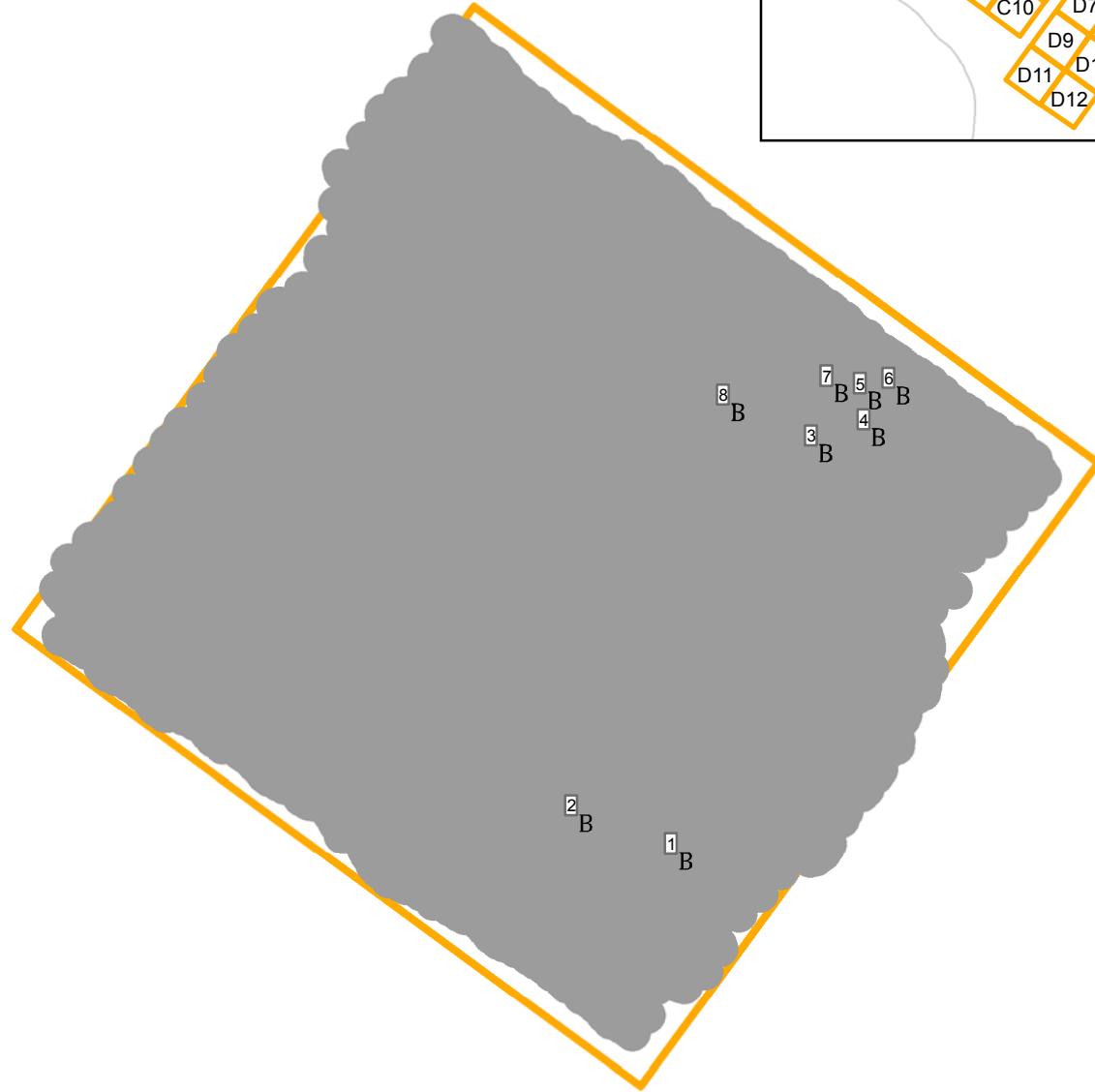
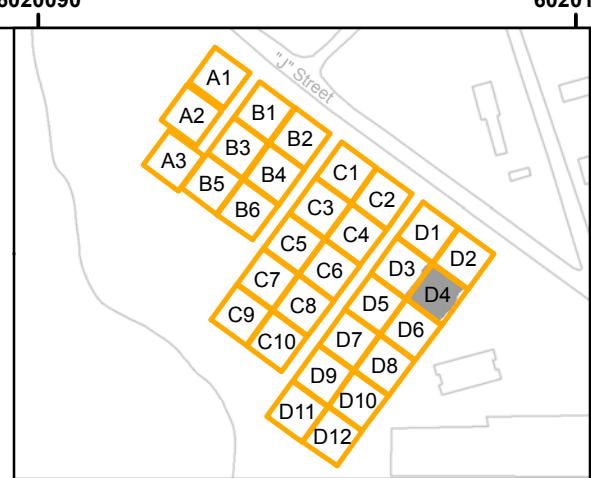
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Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

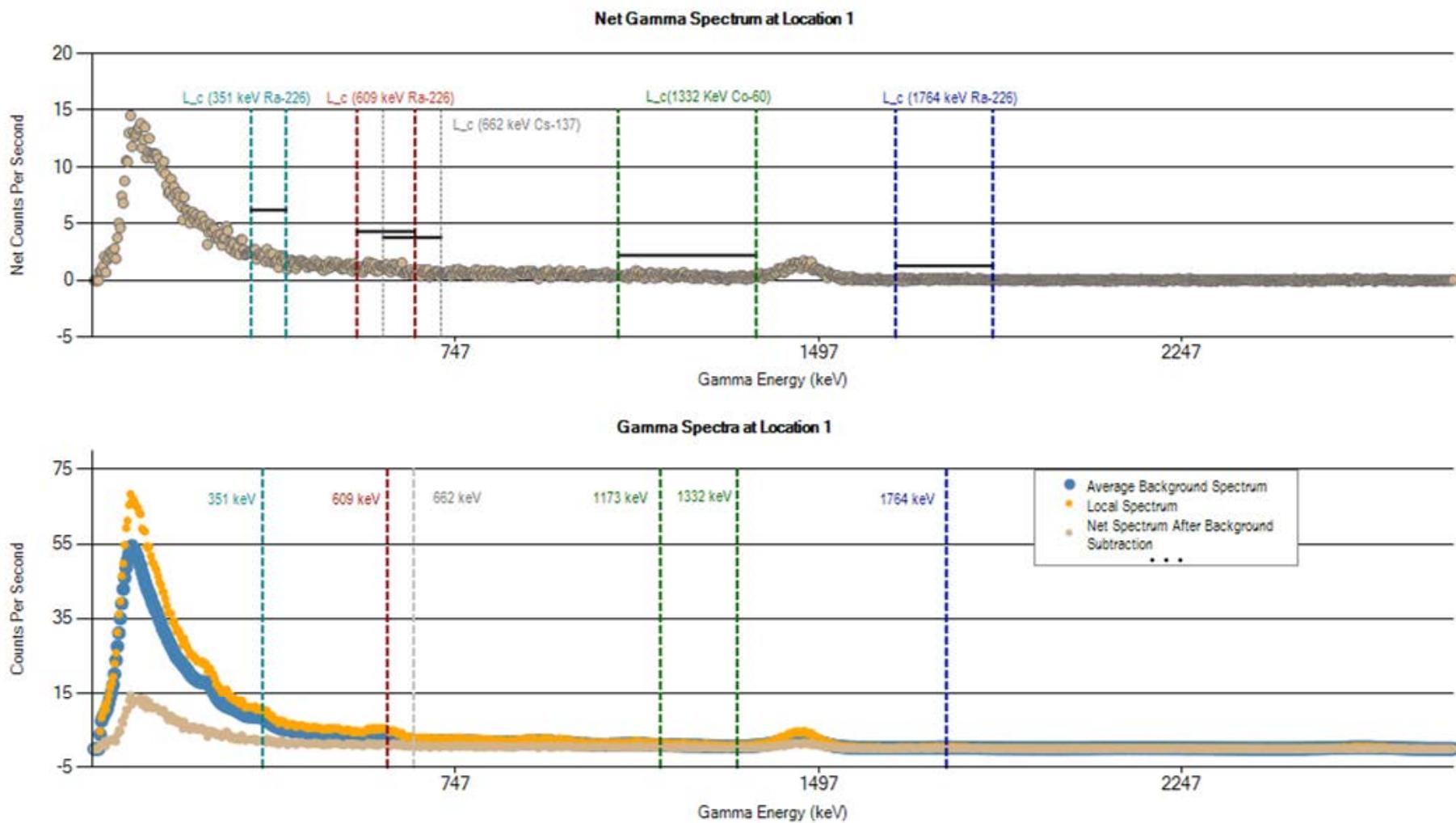
**Survey Instrument: Model 2221/ 44-20
Serial Number: 117634**

B Biased Sample Locations

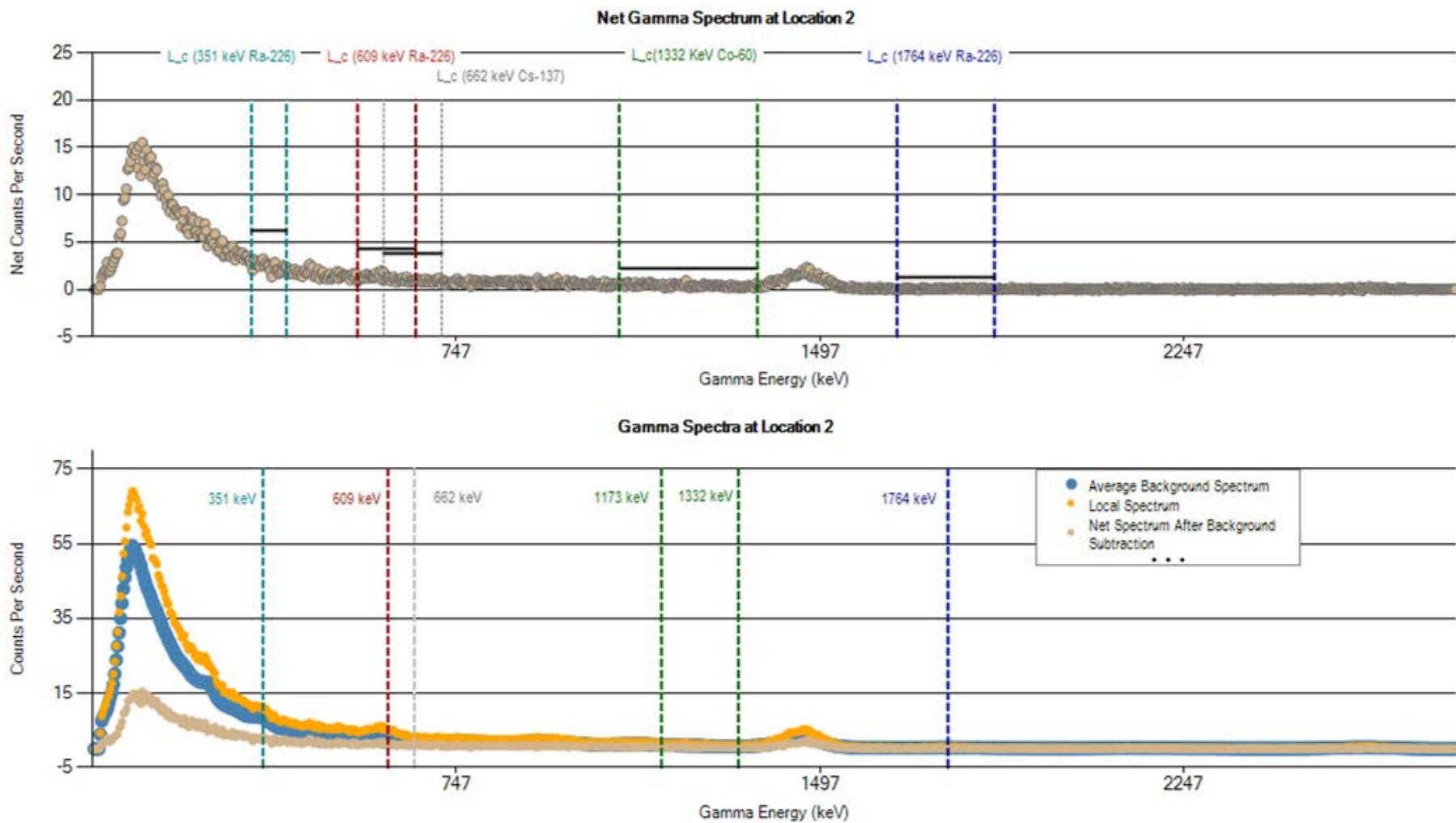
RS-700 GWS Scan Coverage

RSY Pad Boundaries

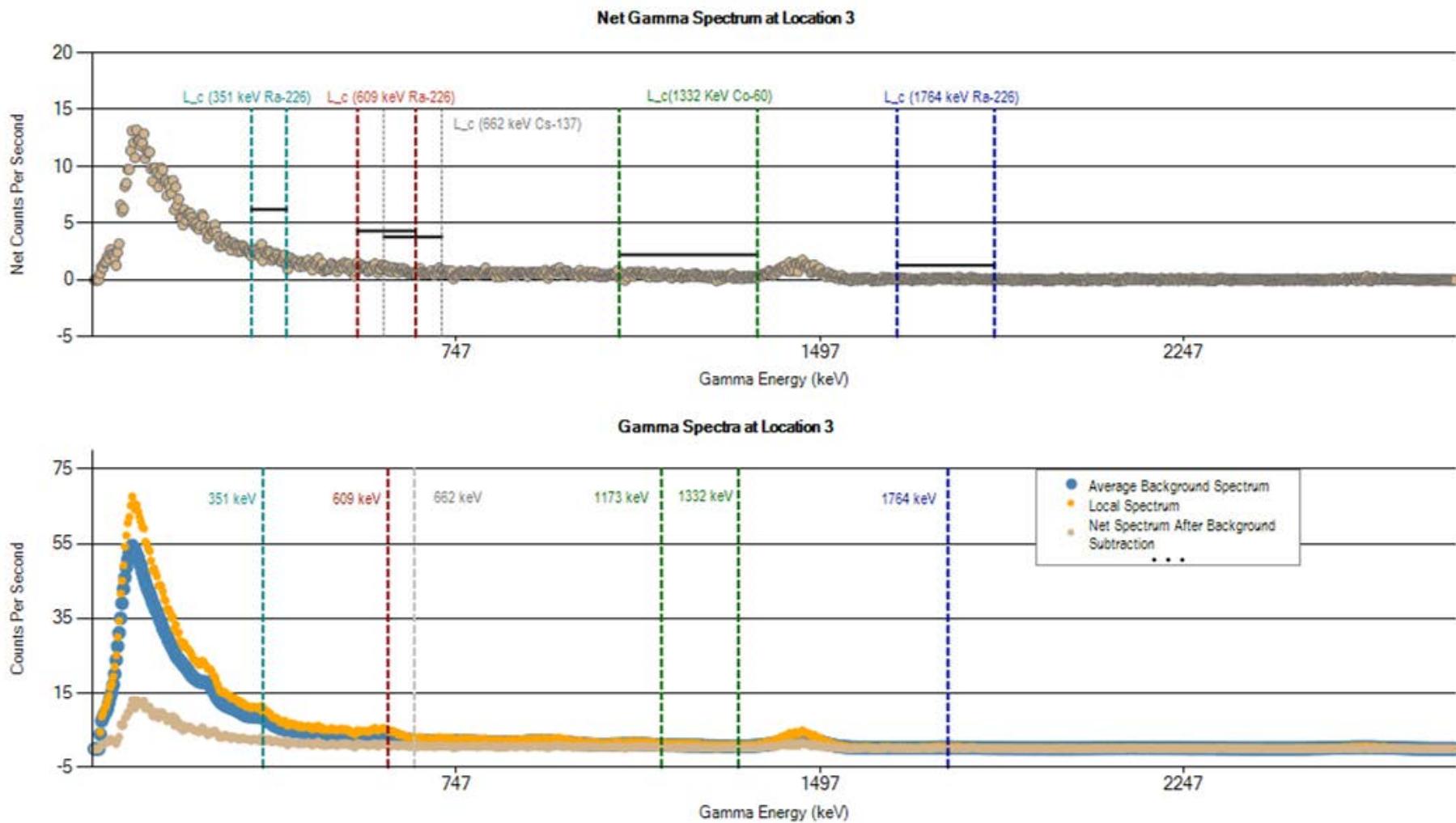




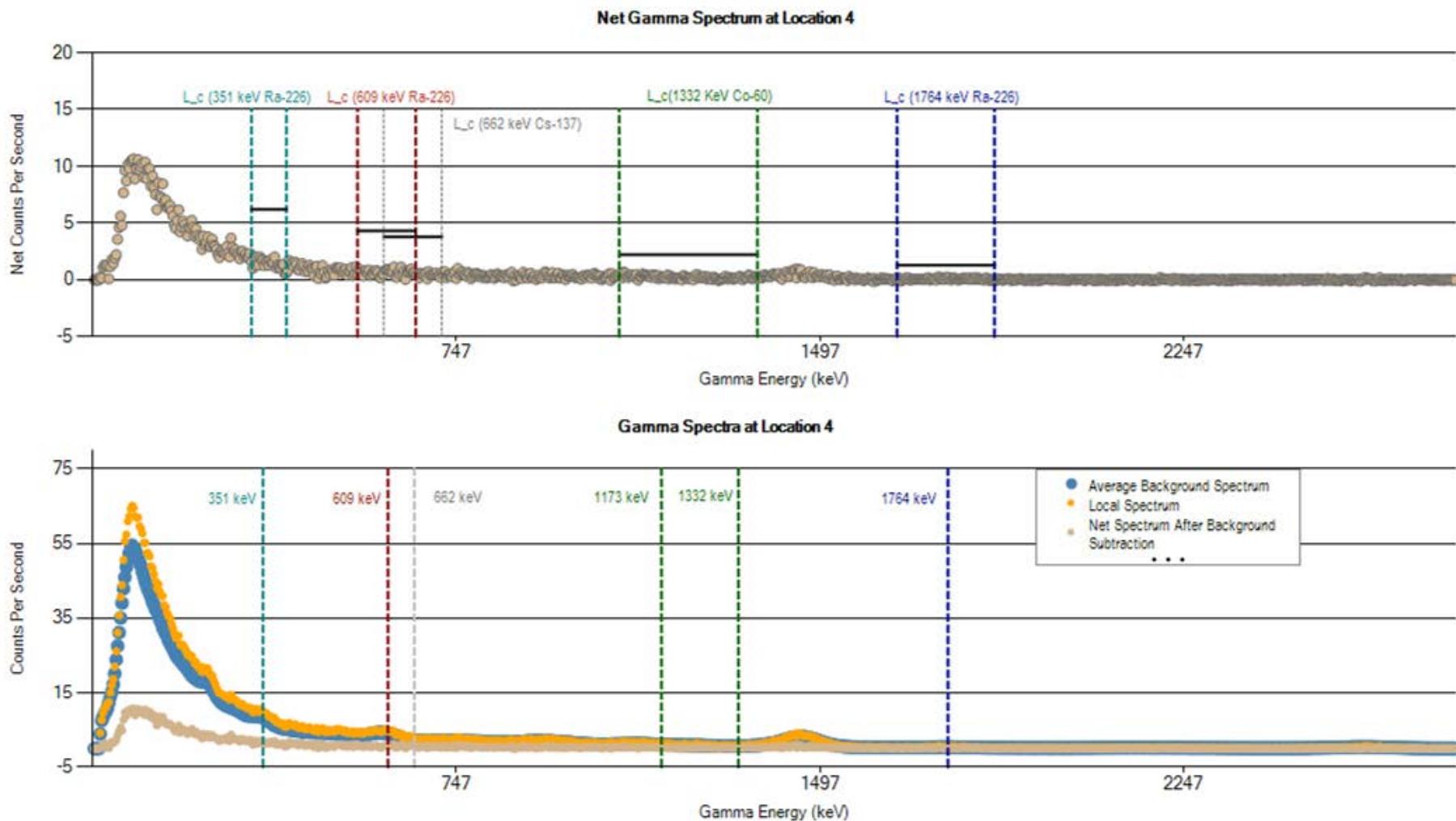
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 1 (cps)	1142	166	27	28	200	183	141	225	124	4621
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



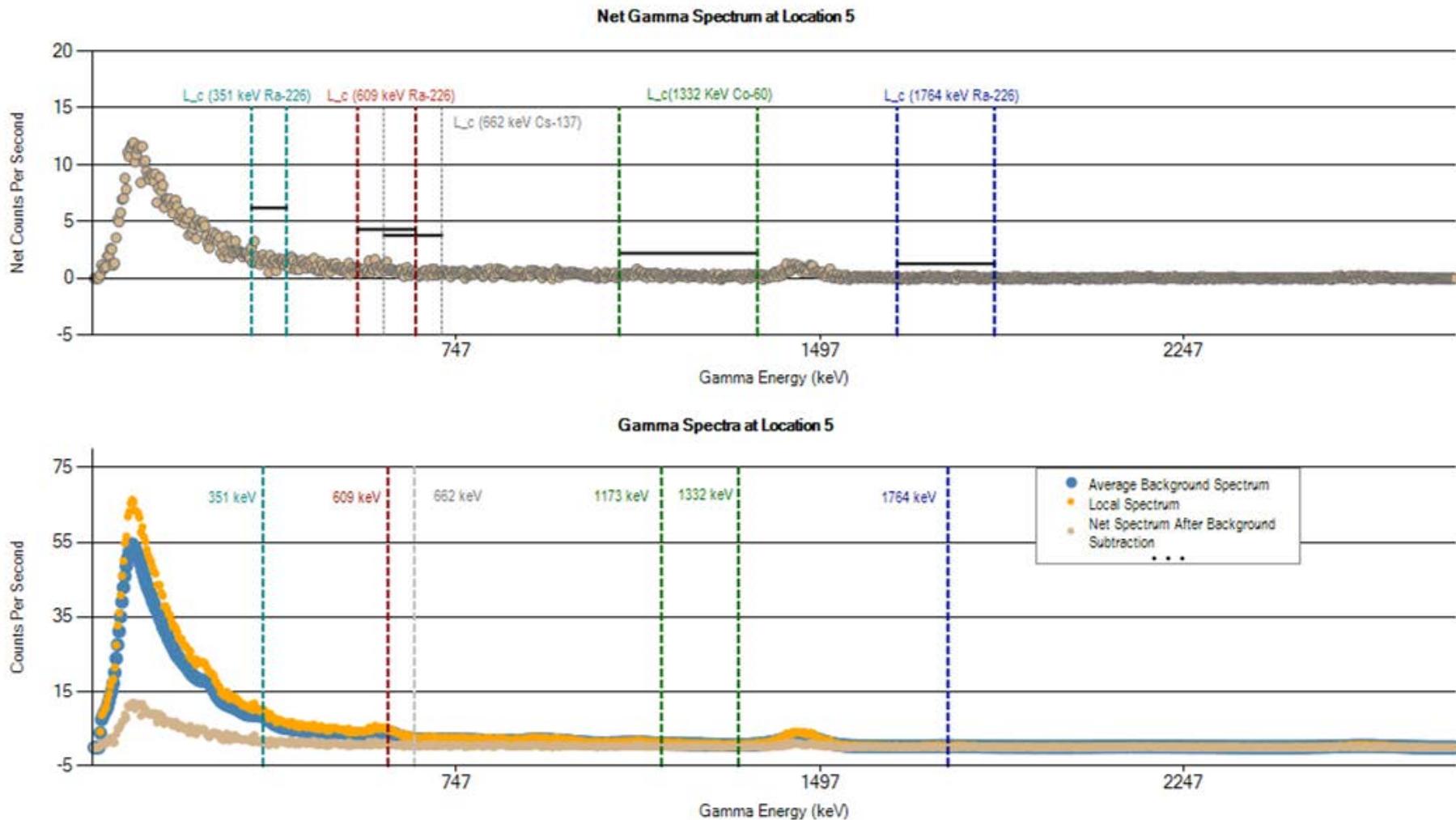
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Location 2 (cps)	1195	178	25	29	207	189	147	234	128	4769
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



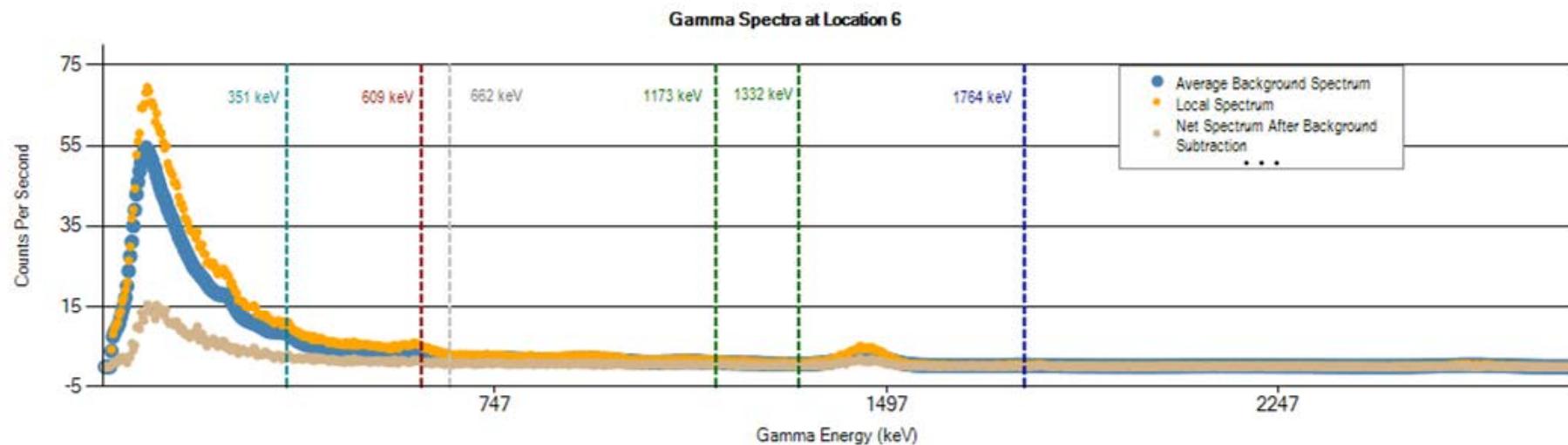
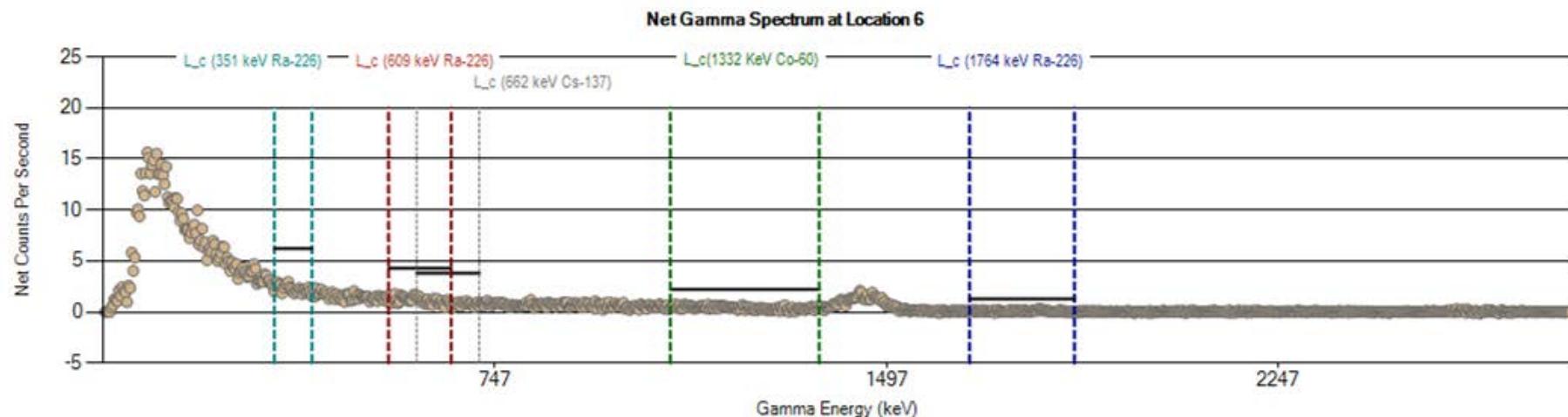
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Location 3 (cps)	1128	161	26	28	196	178	138	228	123	4558
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



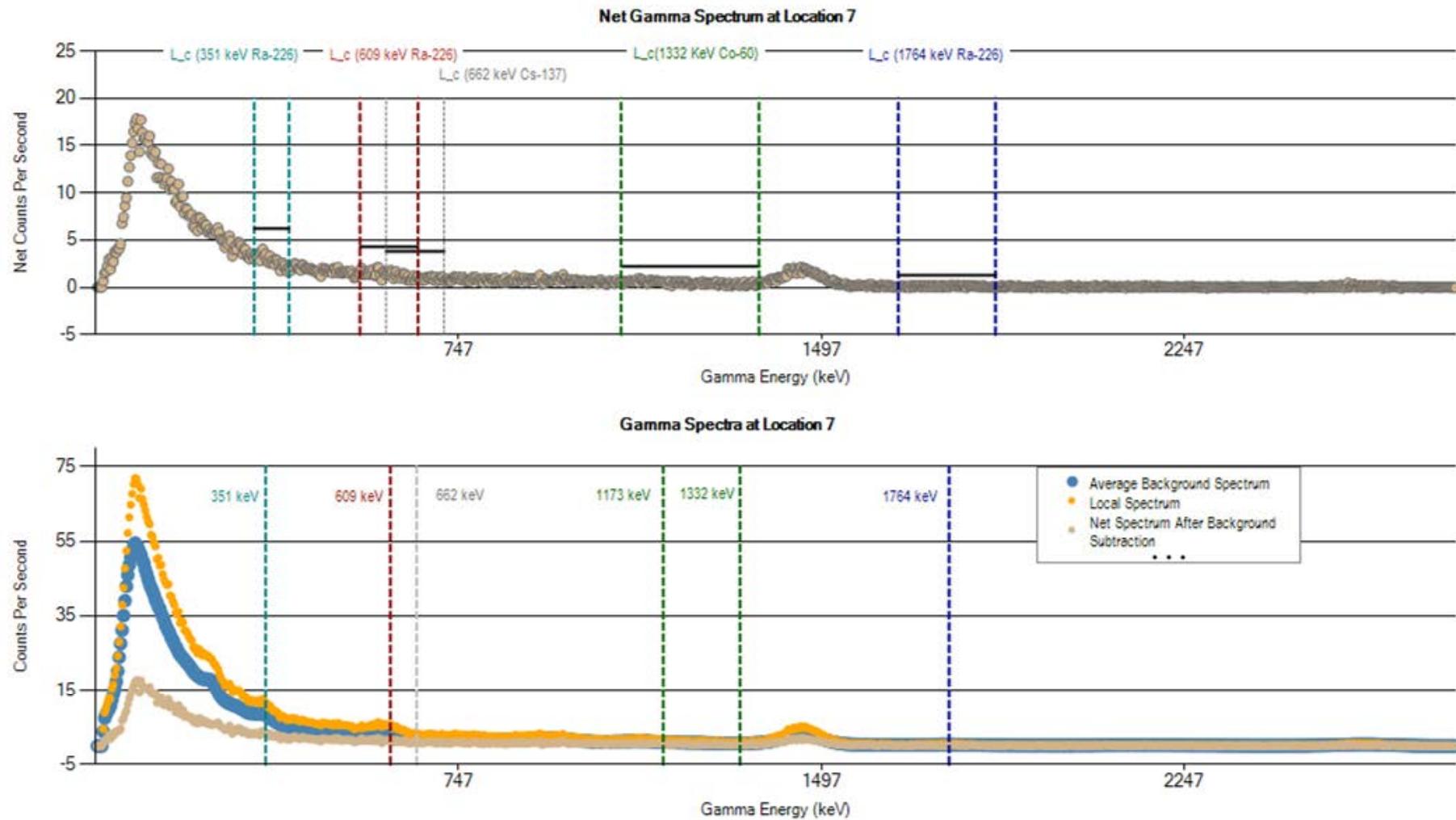
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 4 (cps)	1023	138	25	25	179	167	131	209	111	4328
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



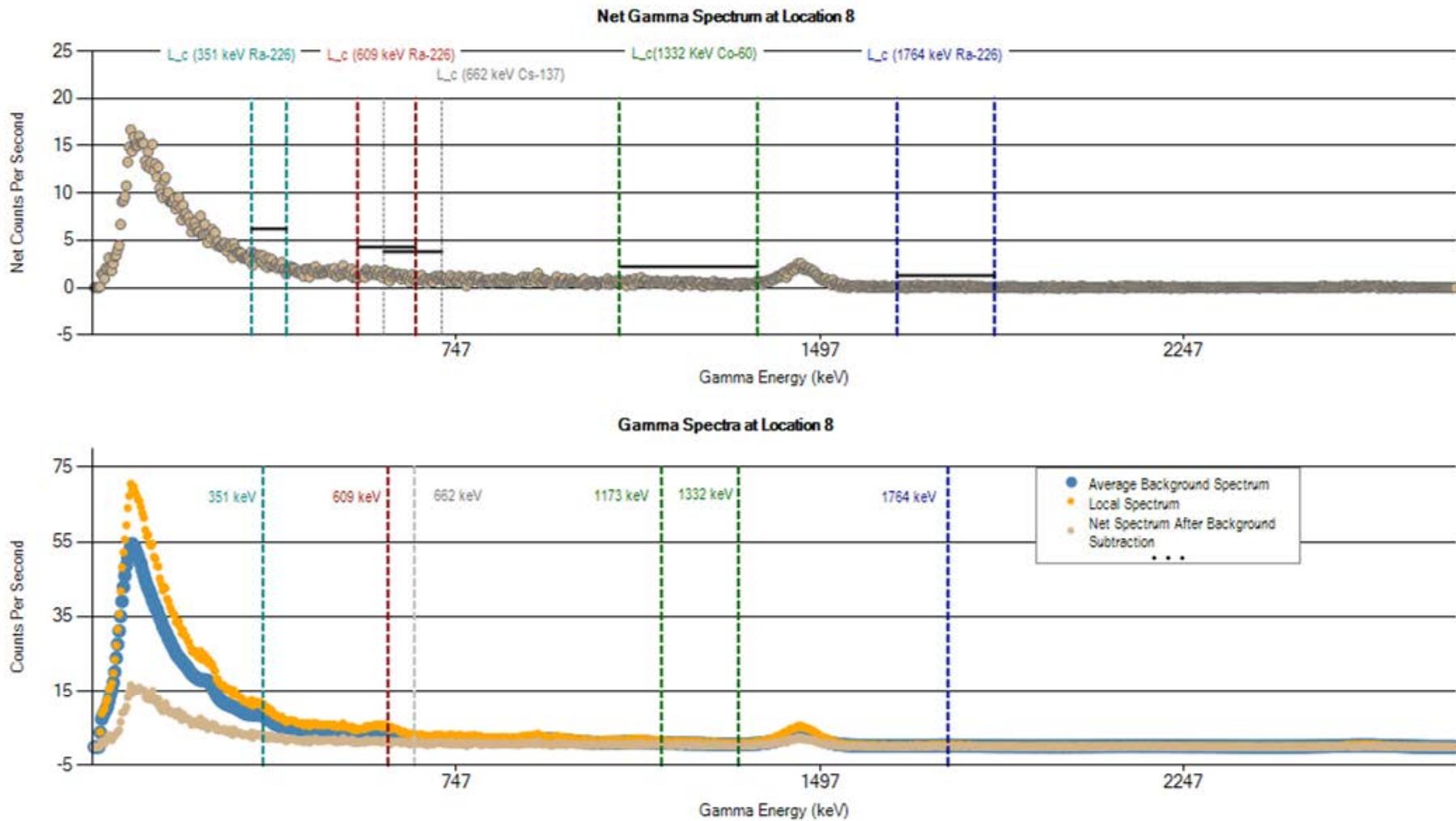
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 5 (cps)	1058	145	25	29	184	171	131	213	113	4412
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



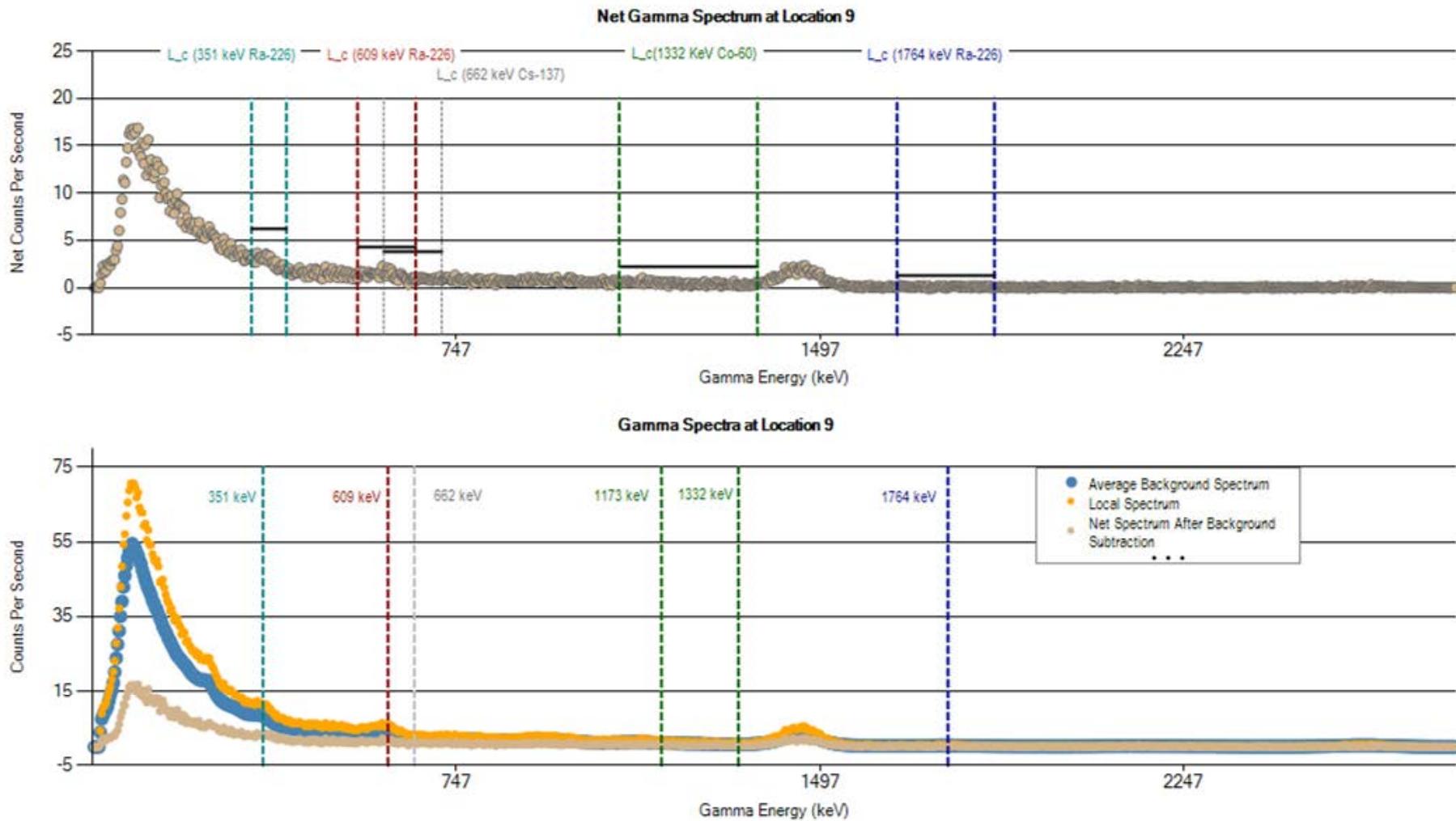
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 6 (cps)	1174	169	26	28	206	187	144	231	127	4702
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



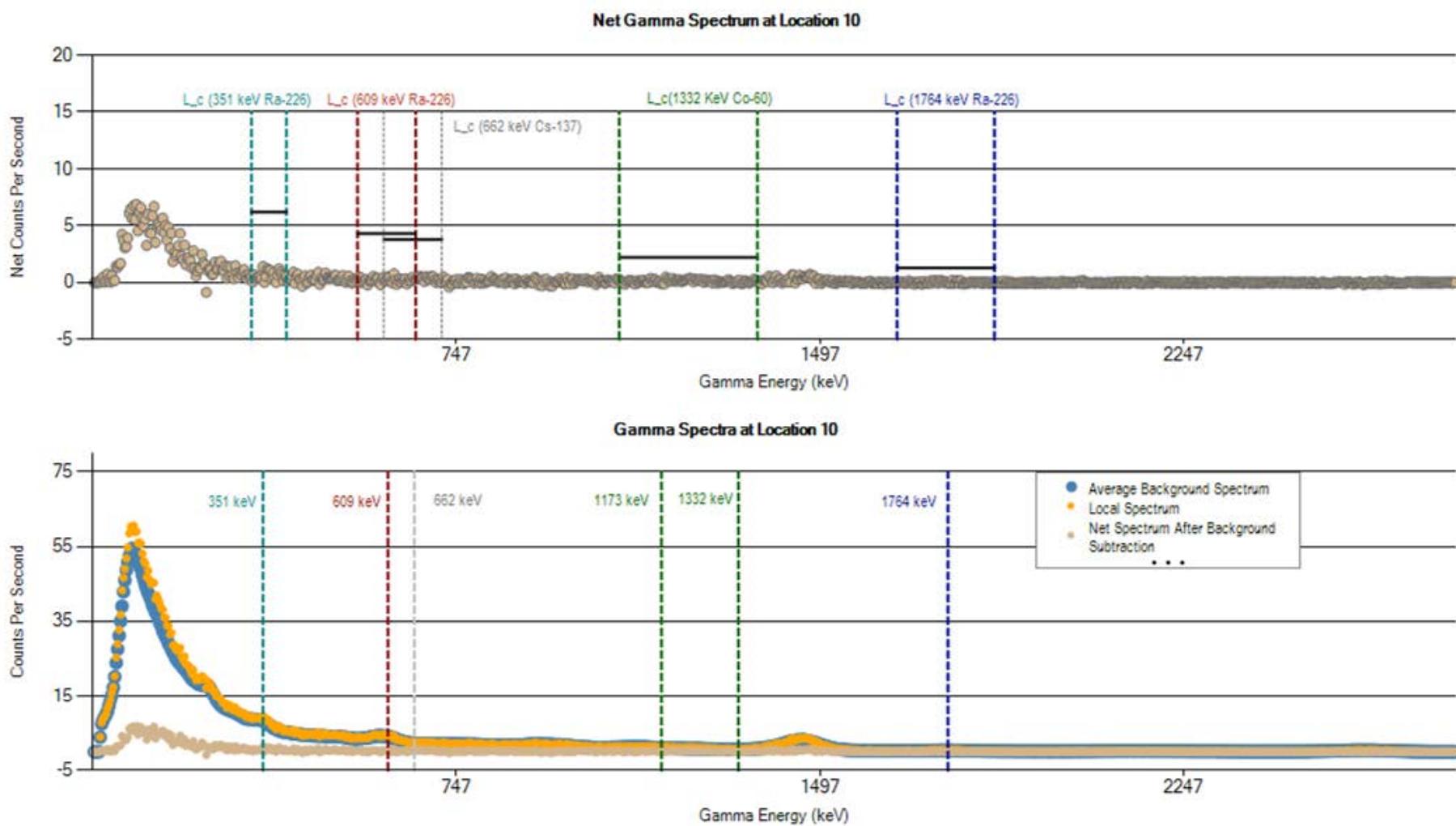
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 7 (cps)	1231	182	27	31	214	195	151	243	134	4907
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



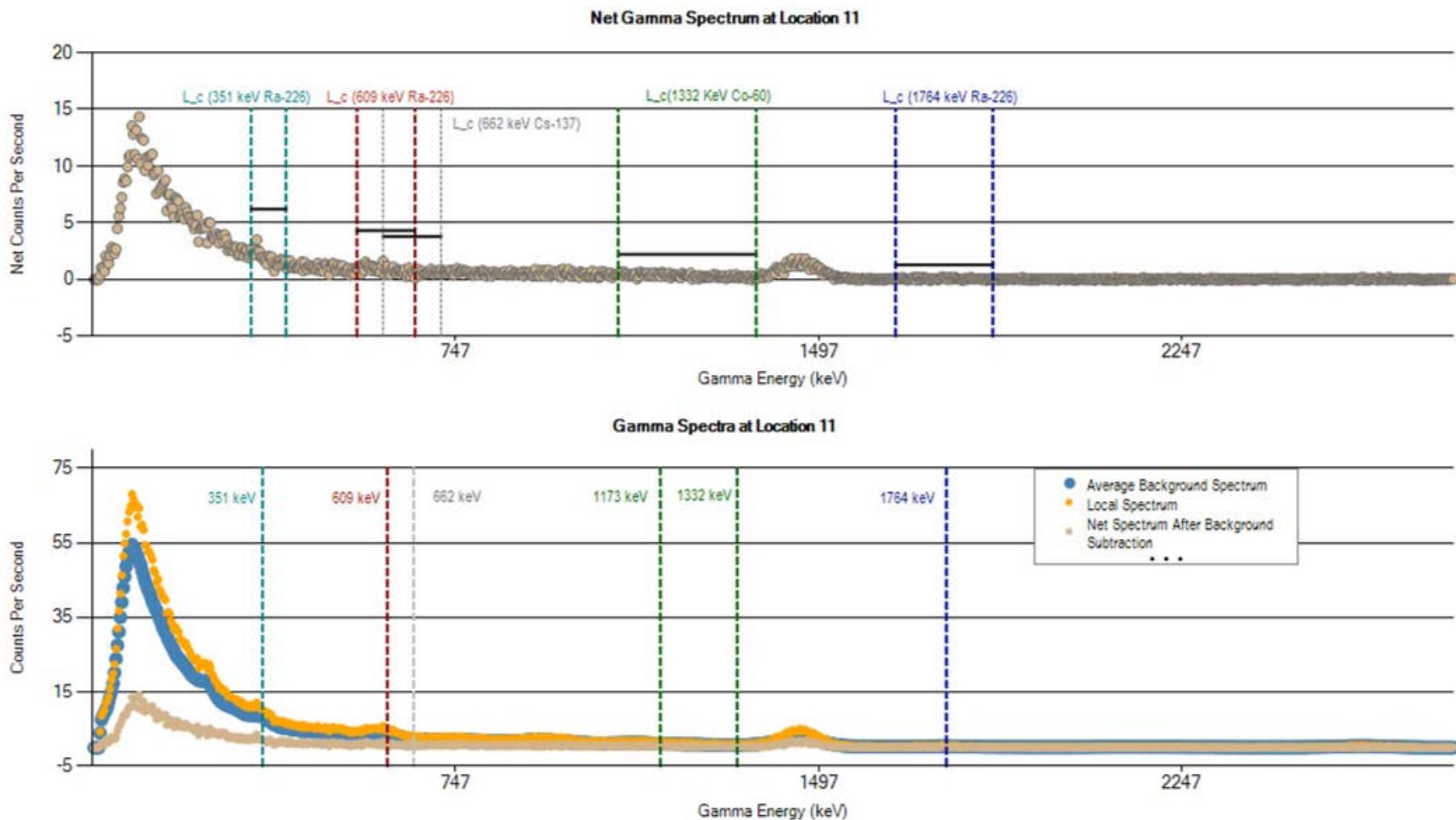
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 8 (cps)	1225	186	27	30	213	194	152	239	135	4840
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



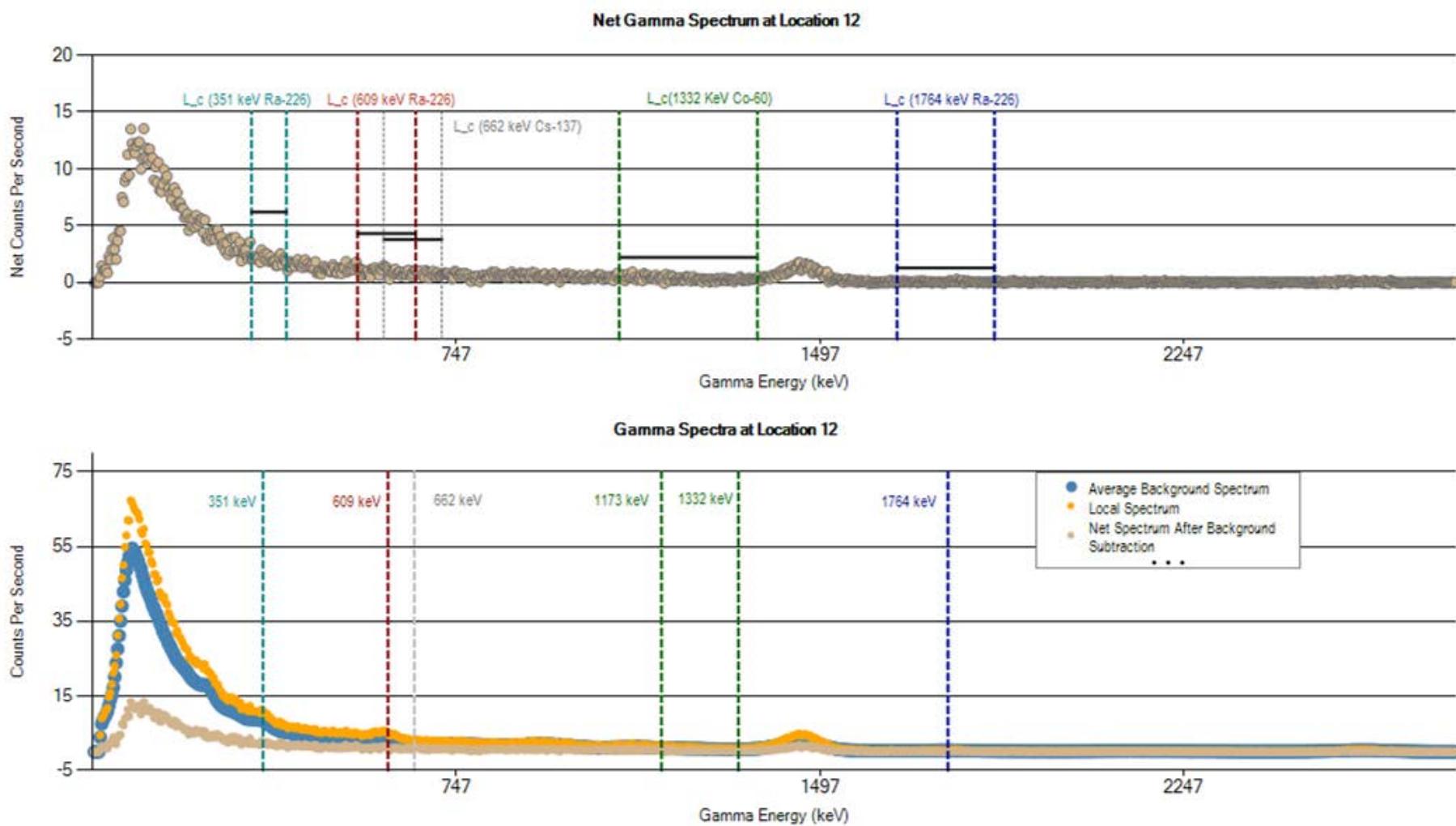
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Location 9 (cps)	1214	185	26	30	208	194	151	242	131	4837
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



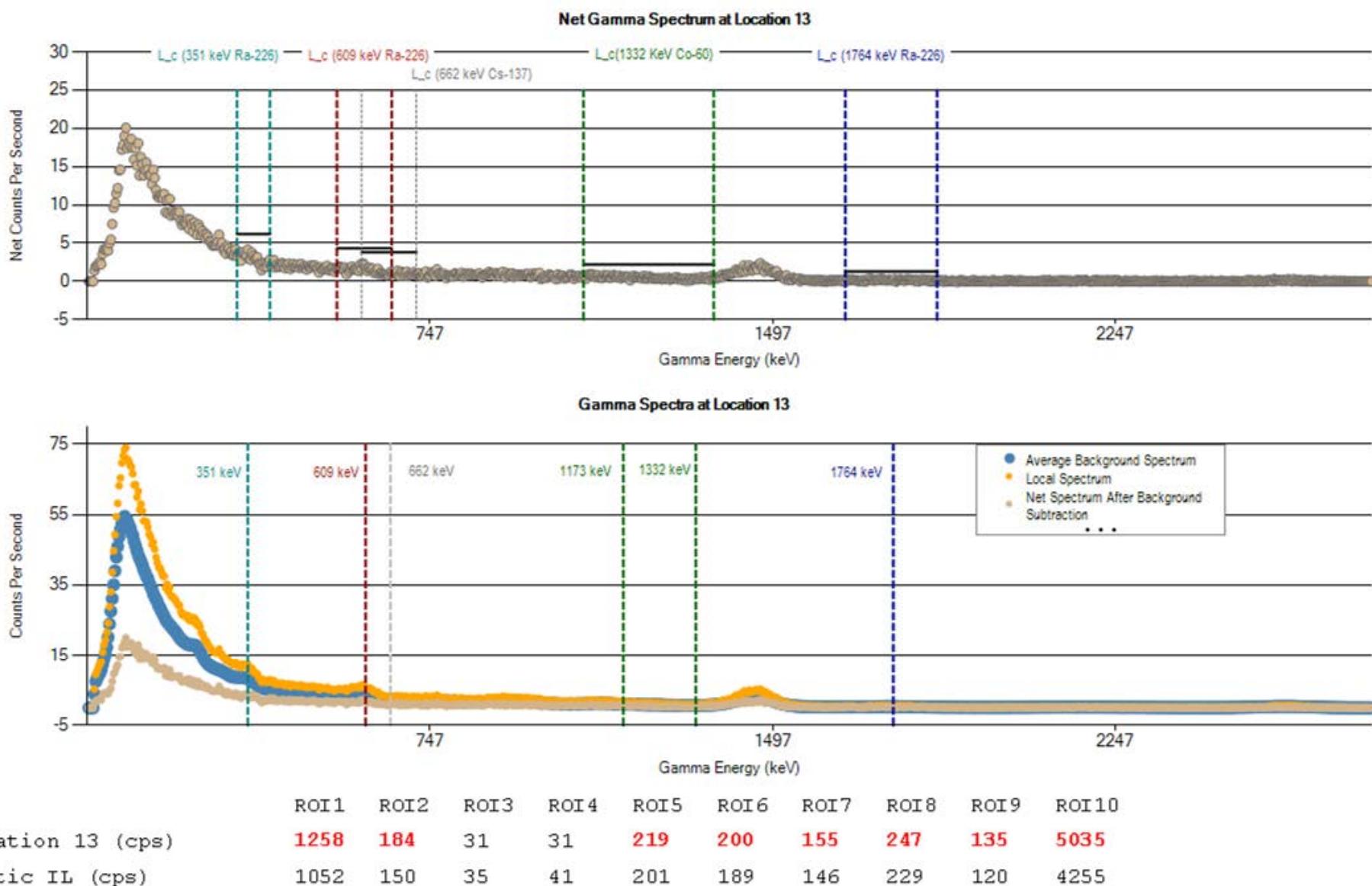
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Location 10 (cps)	923	129	21	23	163	149	118	189	101	3955
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

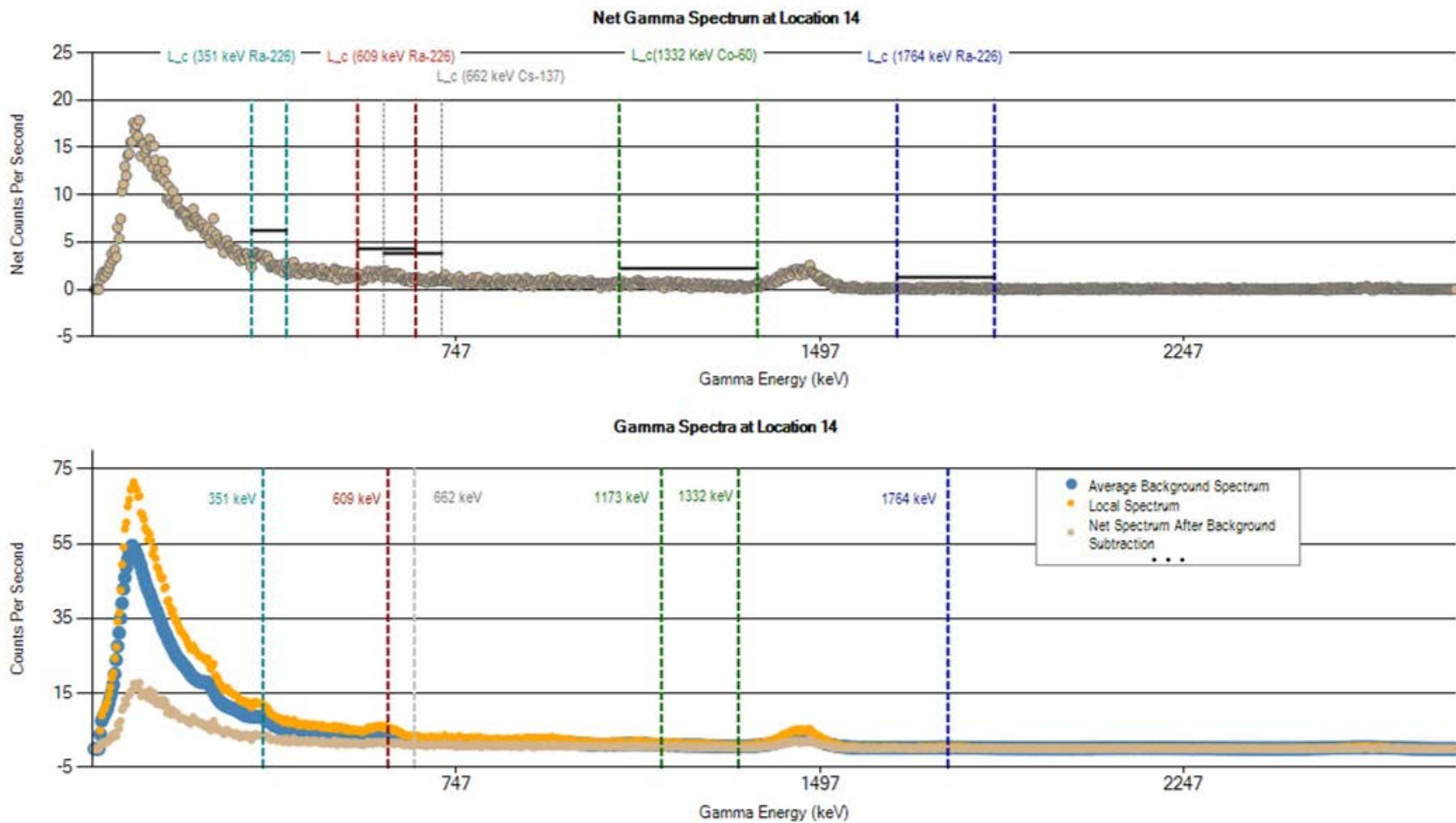


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Location 11 (cps)	1099	165	24	27	189	174	134	219	119	4510
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

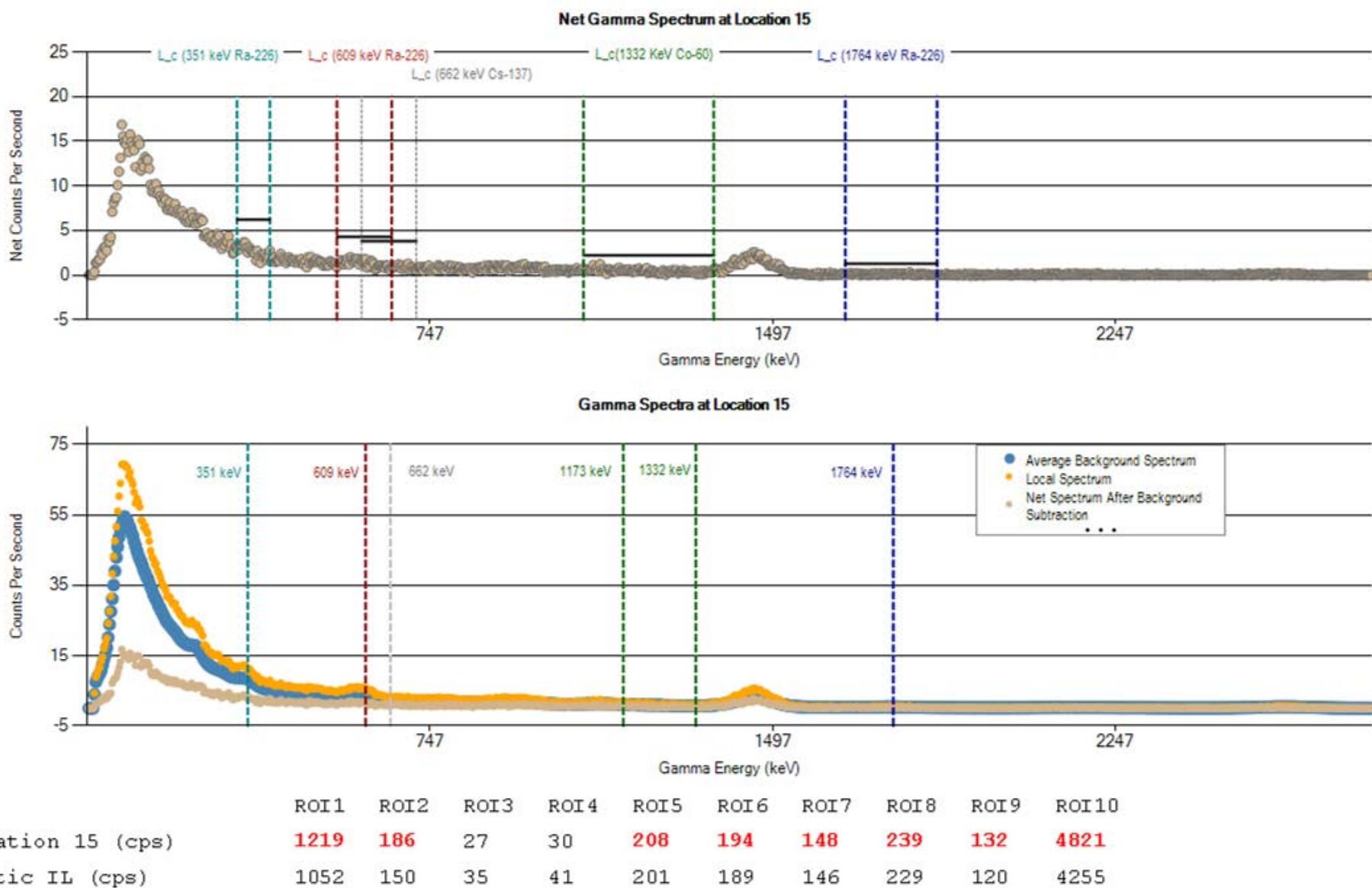


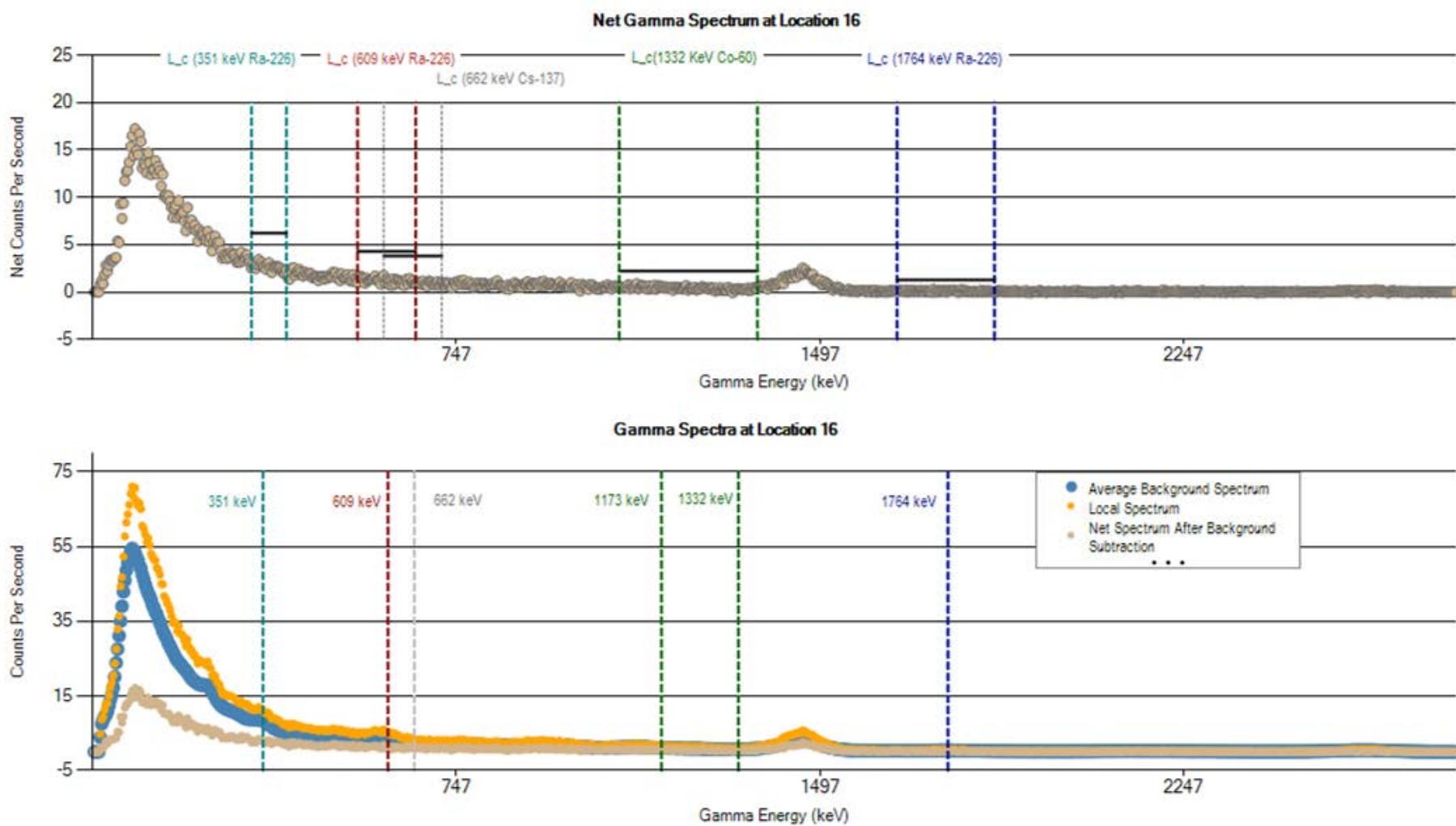
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 12 (cps)	1131	164	24	27	196	179	141	225	122	4577
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



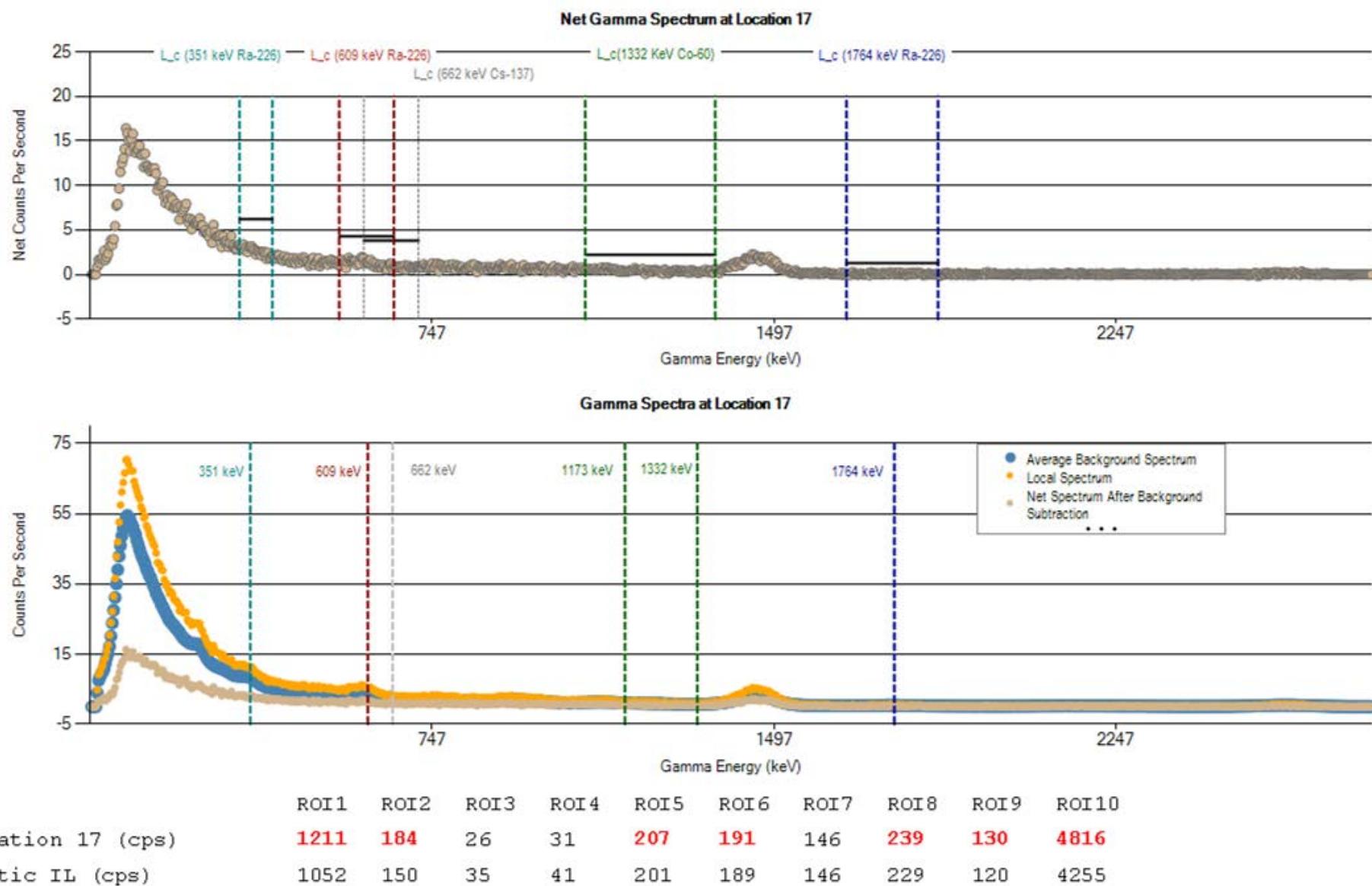


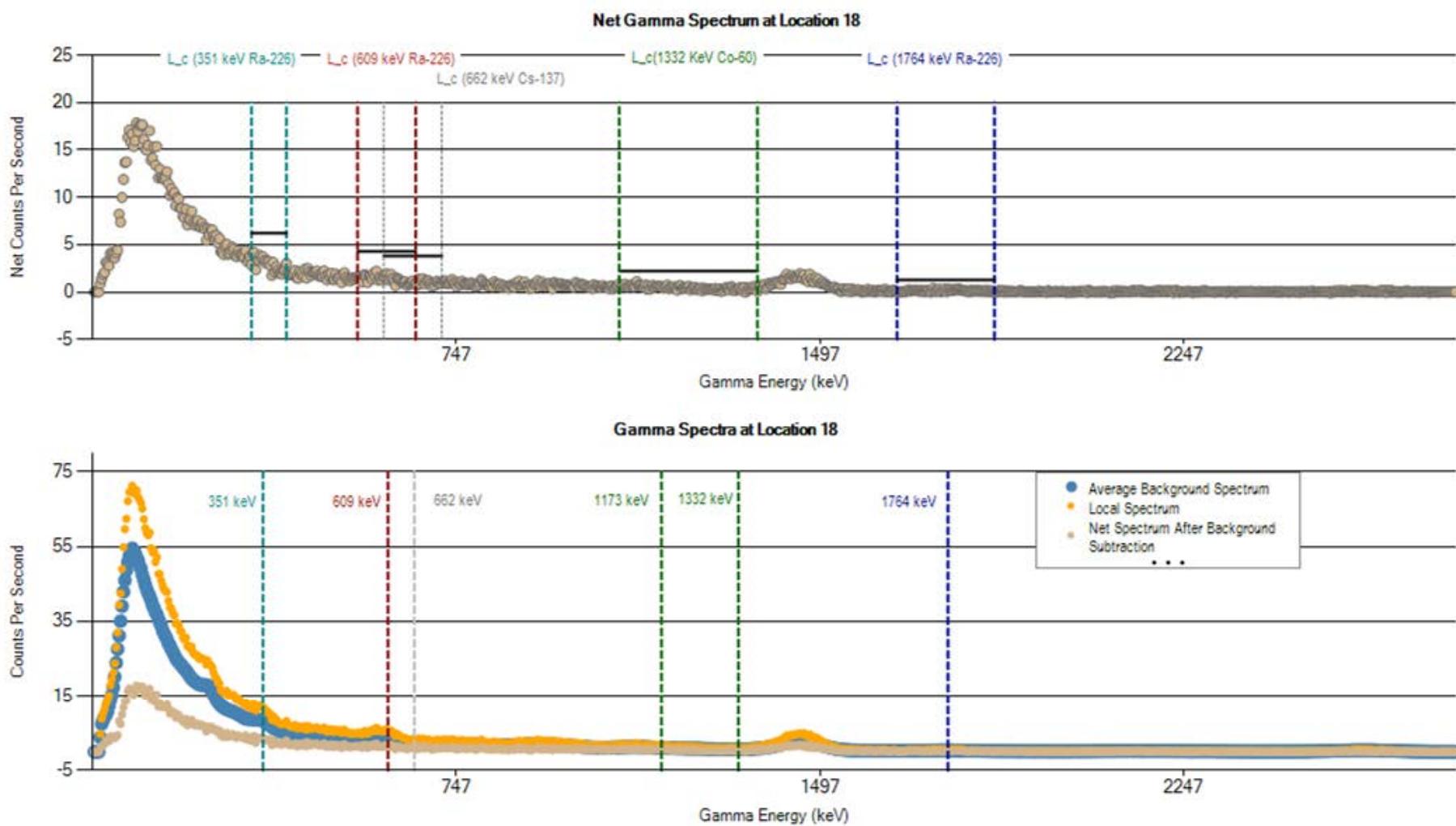
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 14 (cps)	1243	186	27	31	213	198	155	248	135	4923
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



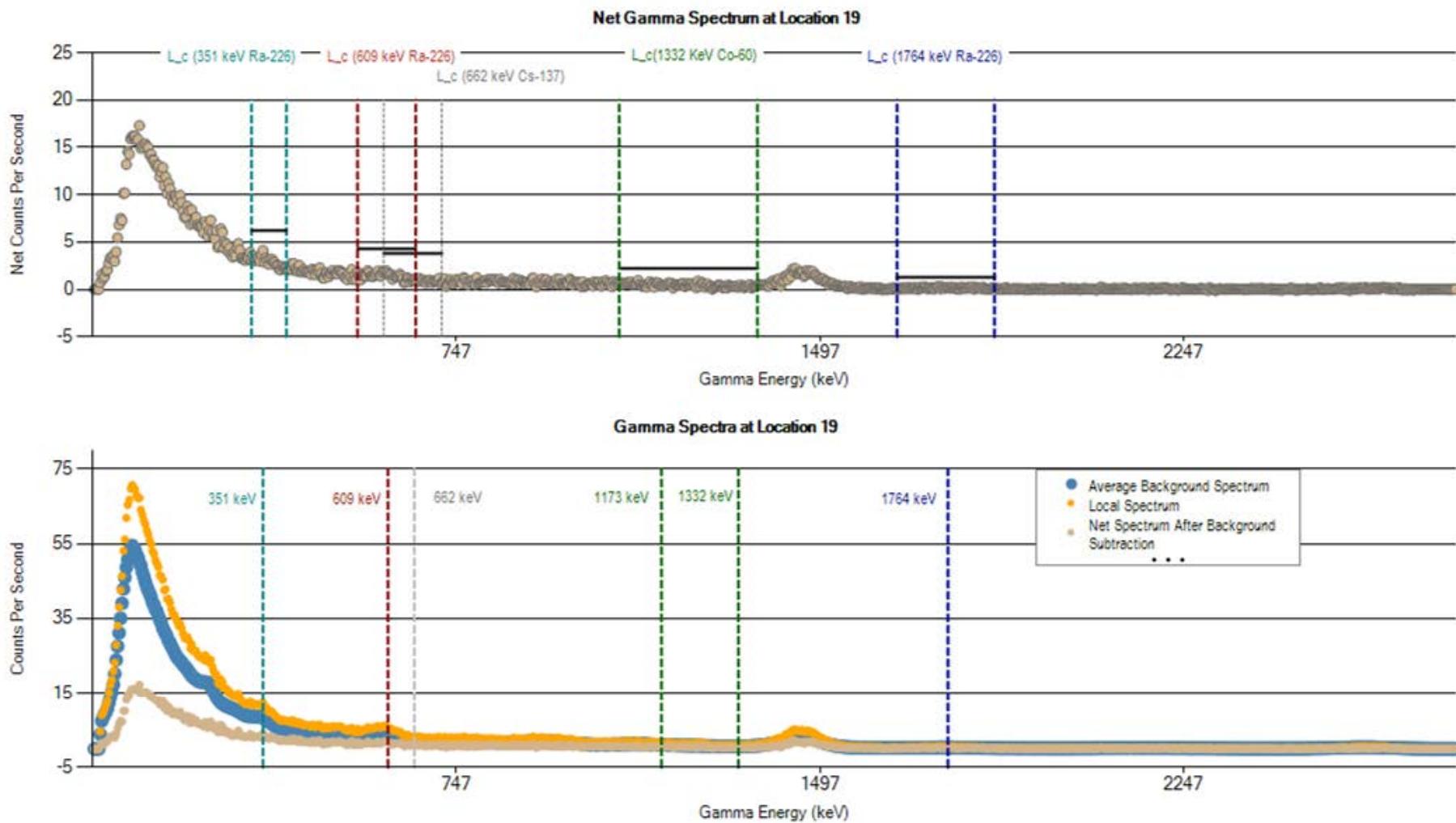


	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 16 (cps)	1210	183	27	29	211	190	148	239	128	4835
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

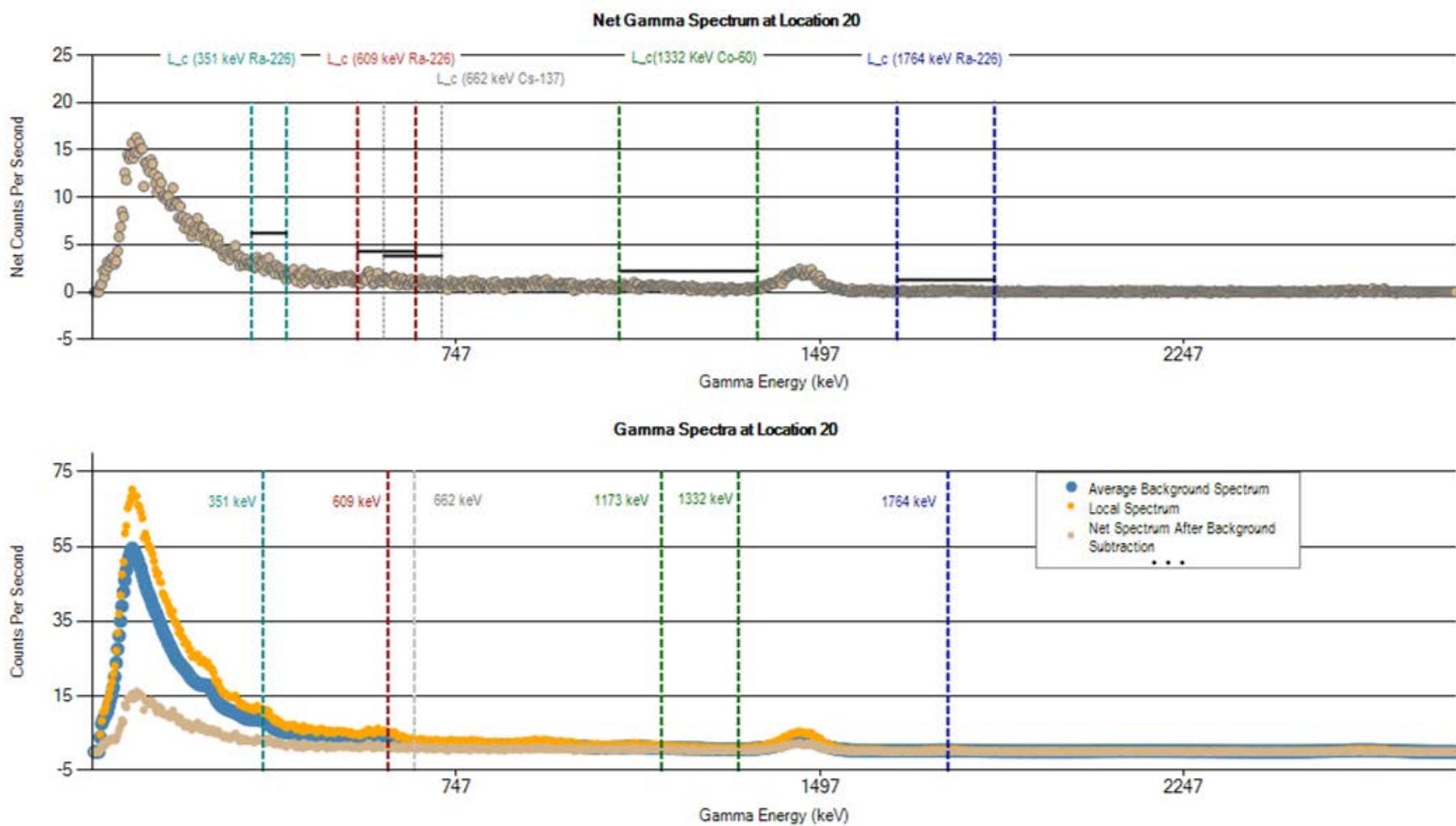




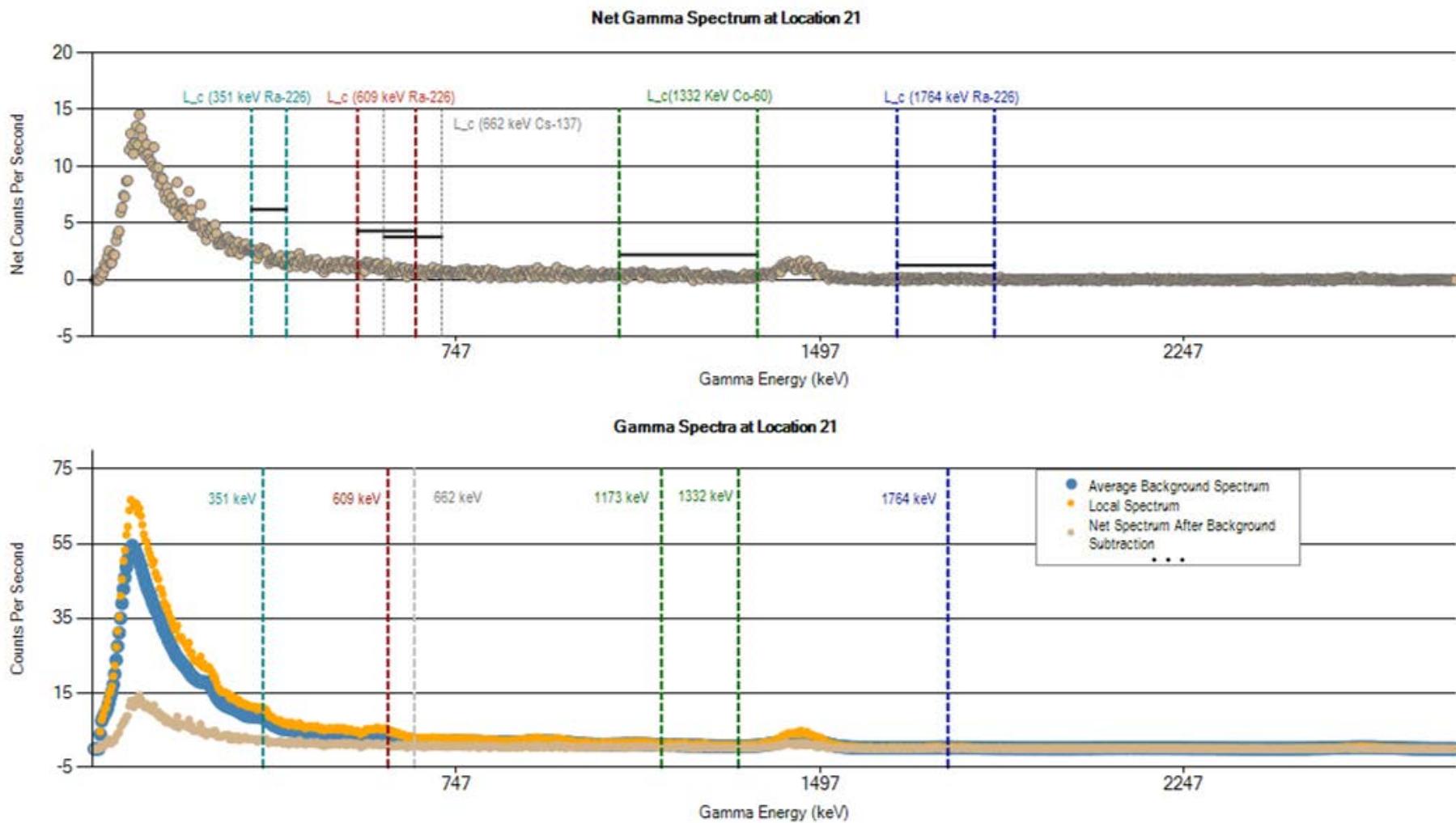
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Location 18 (cps)	1226	177	30	29	214	195	153	246	131	4949
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



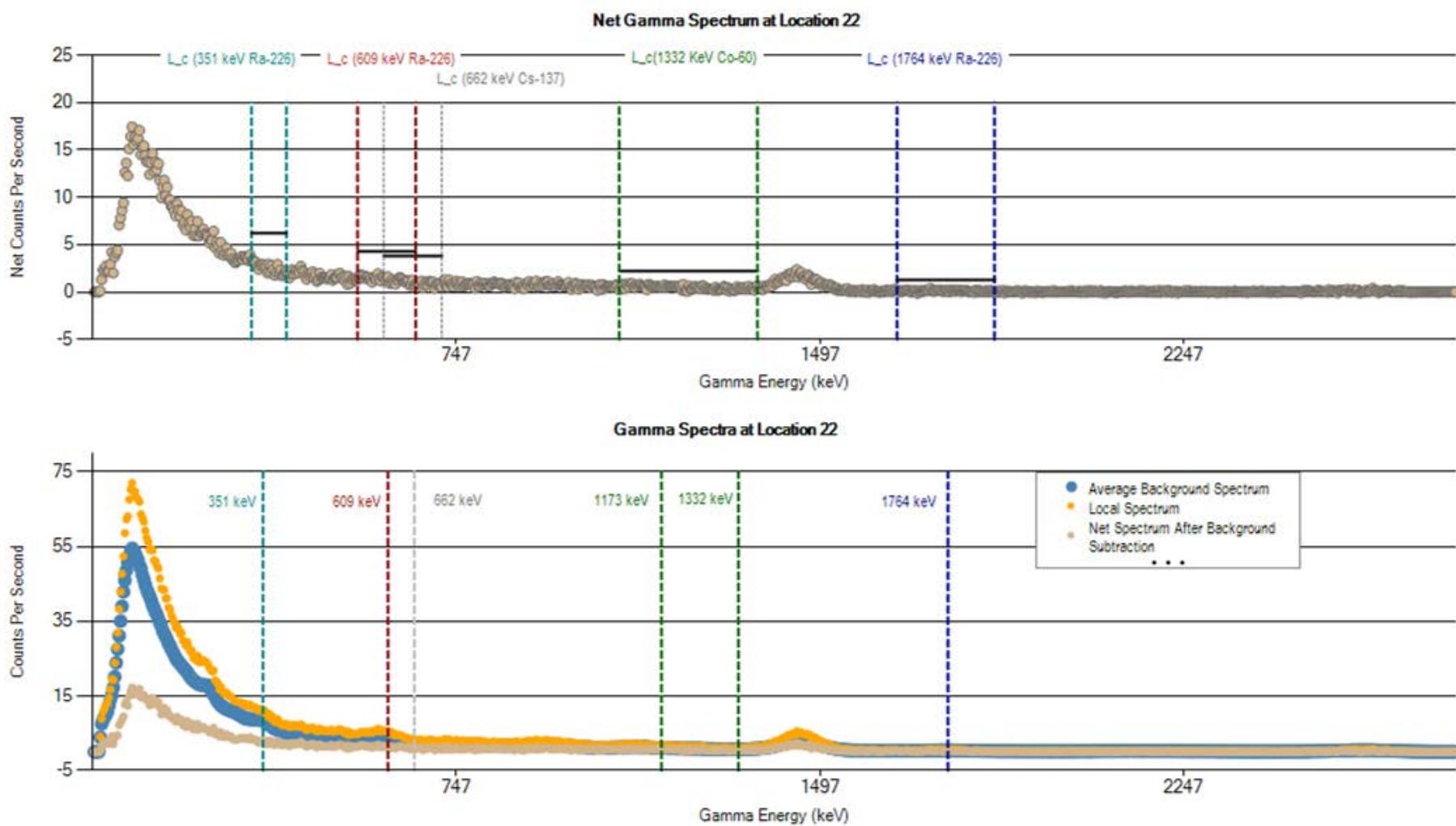
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Location 19 (cps)	1233	179	30	30	214	197	152	246	132	4916
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



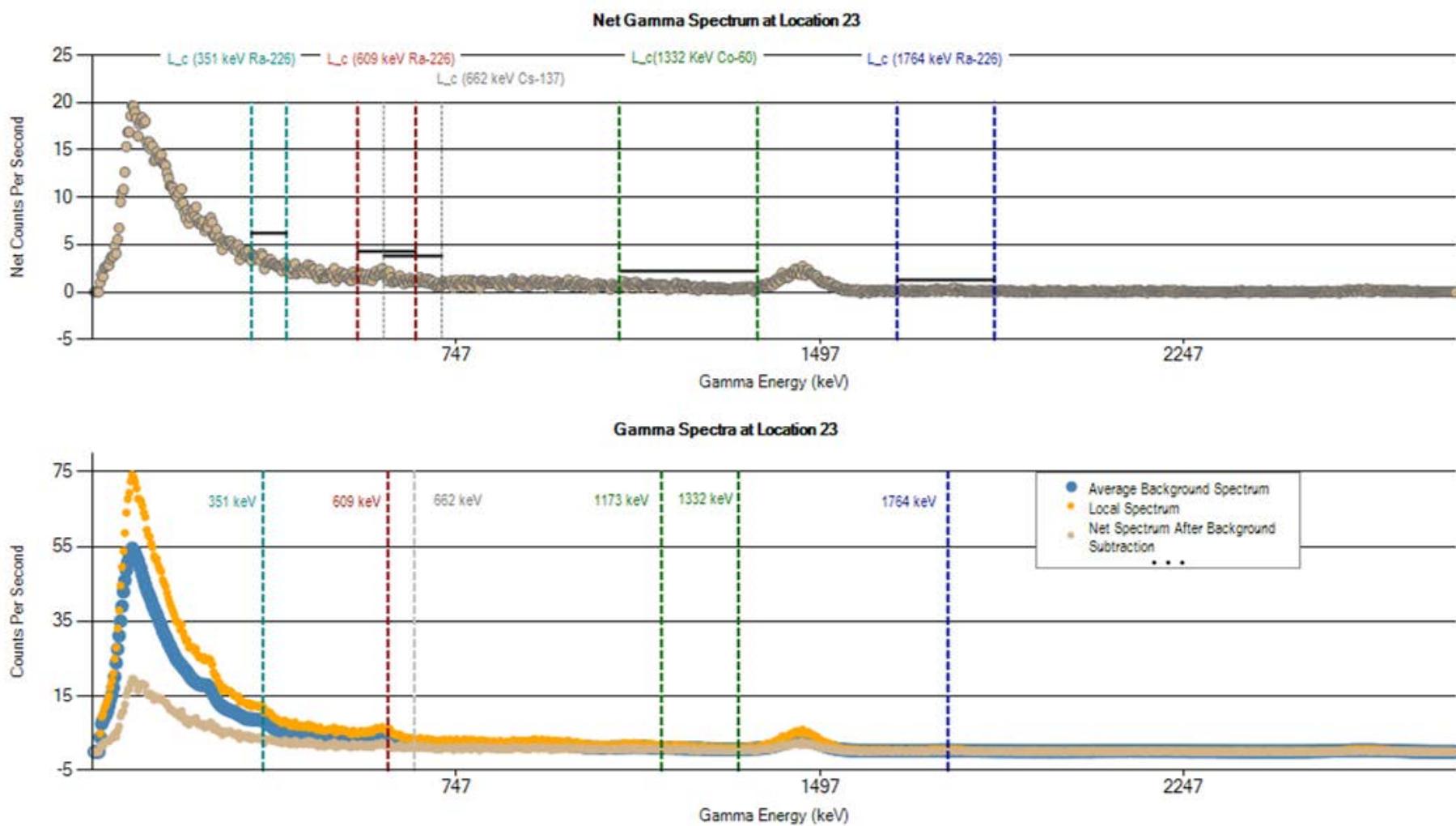
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Location 20 (cps)	1213	187	26	30	207	191	150	238	132	4826
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



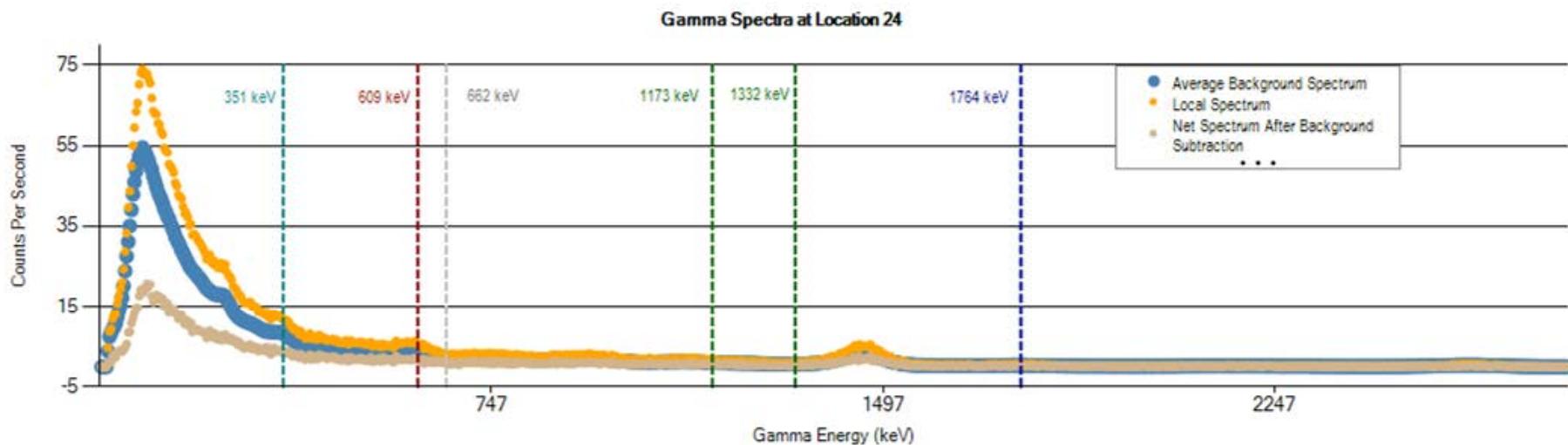
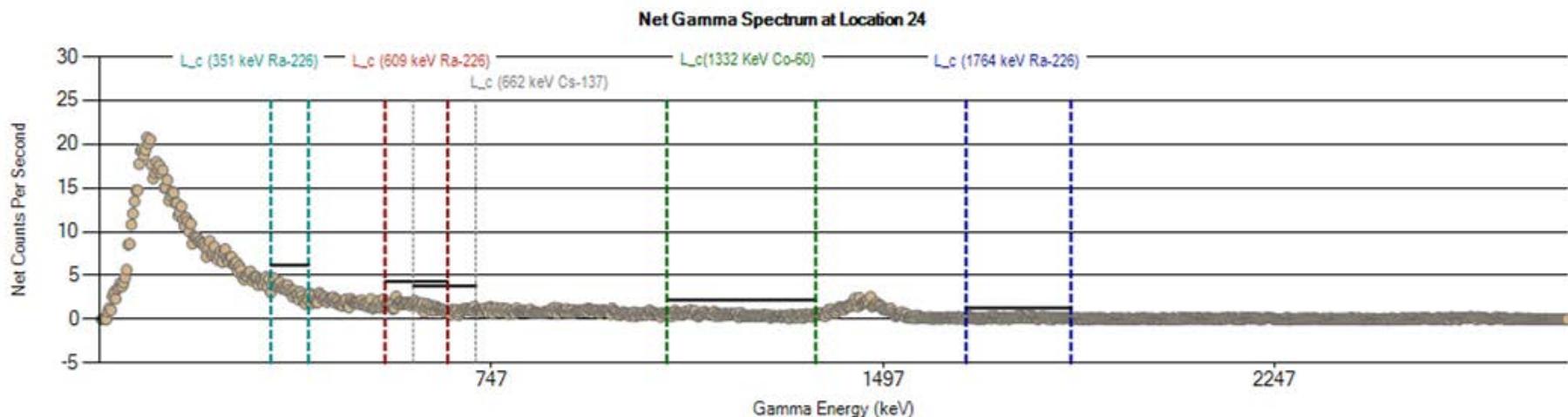
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 21 (cps)	1131	162	26	28	201	179	139	225	124	4569
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



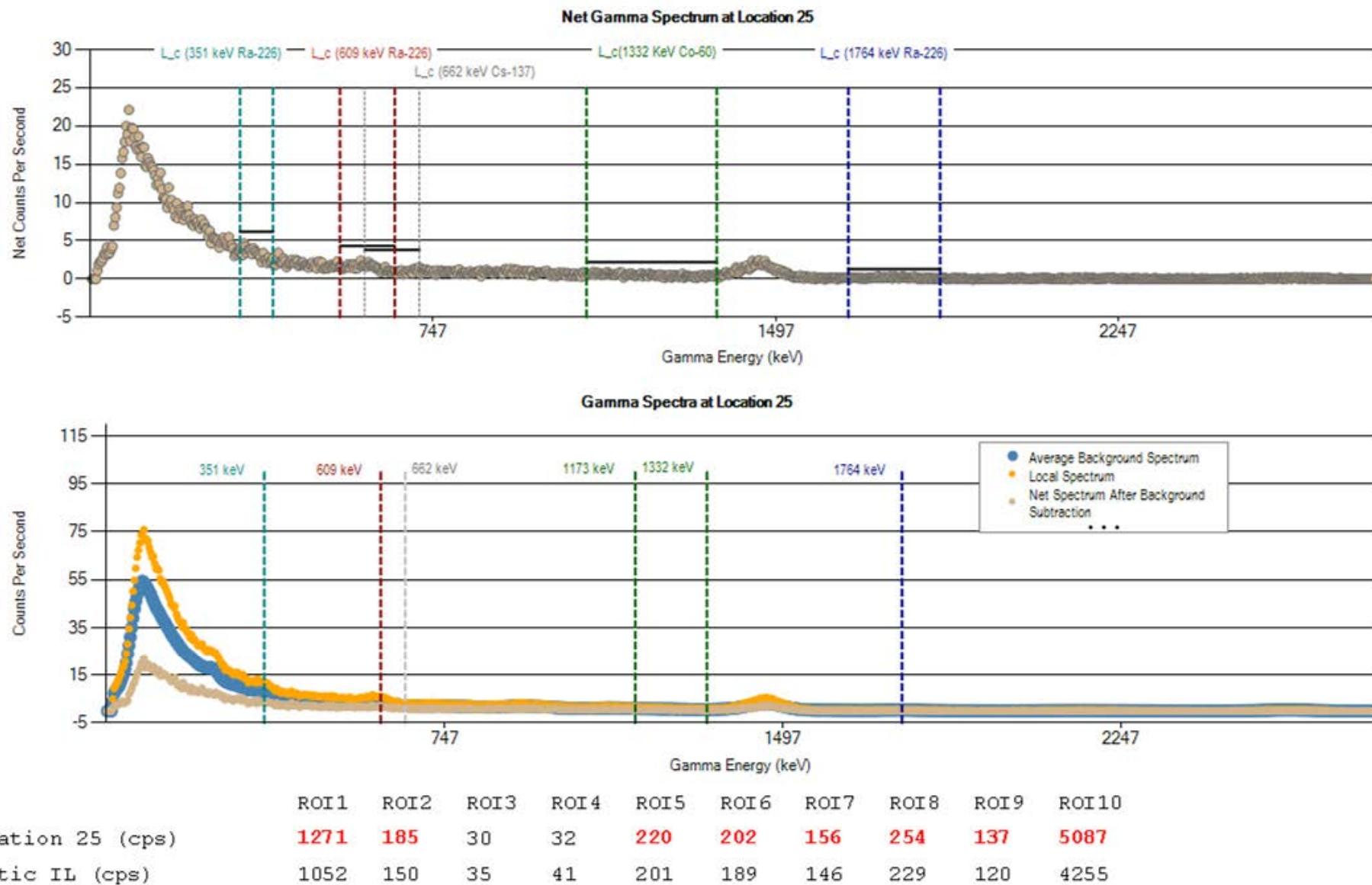
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 22 (cps)	1223	178	28	32	210	194	150	236	134	4858
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

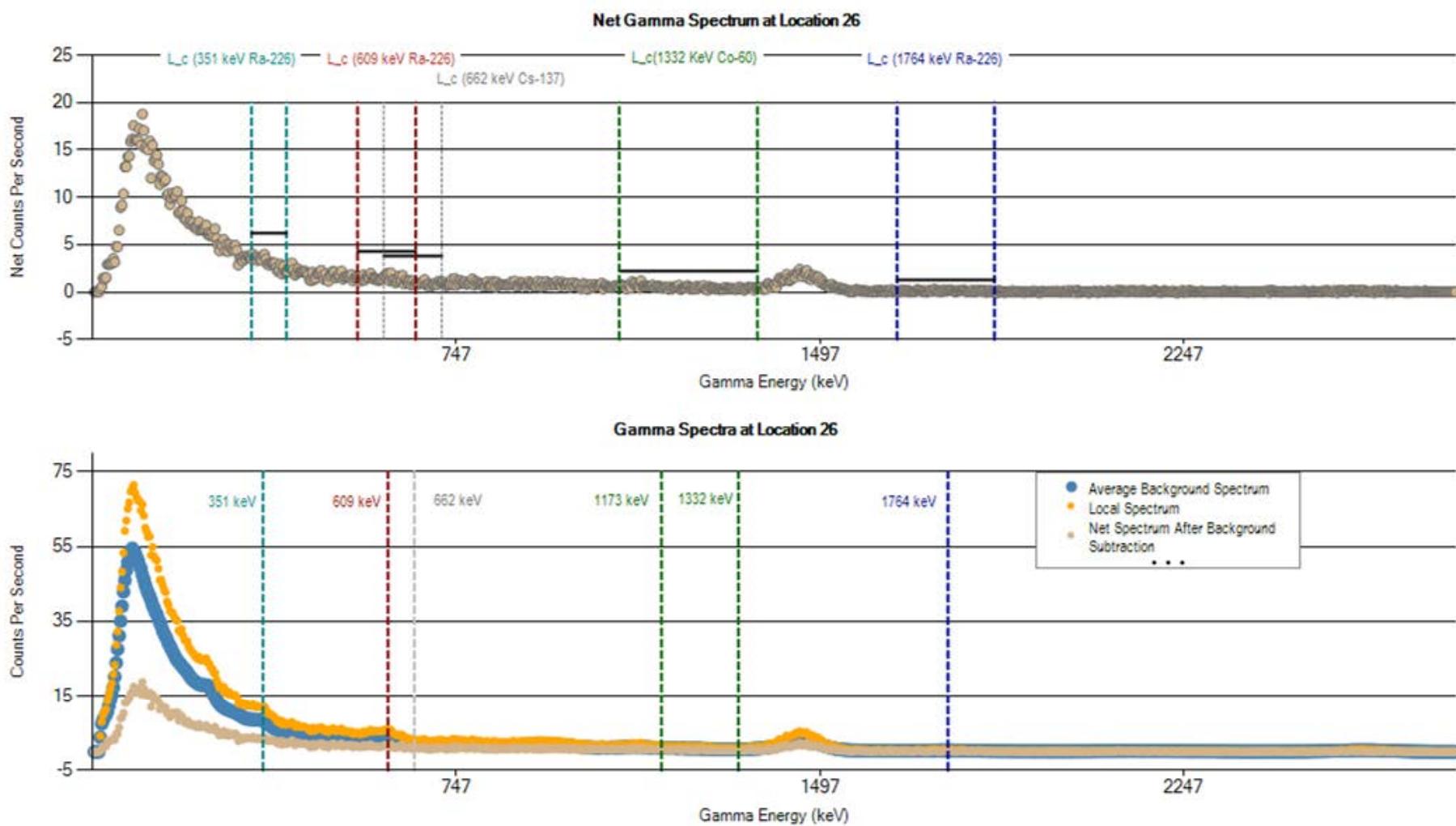


	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 23 (cps)	1287	193	29	32	217	202	156	252	140	5082
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

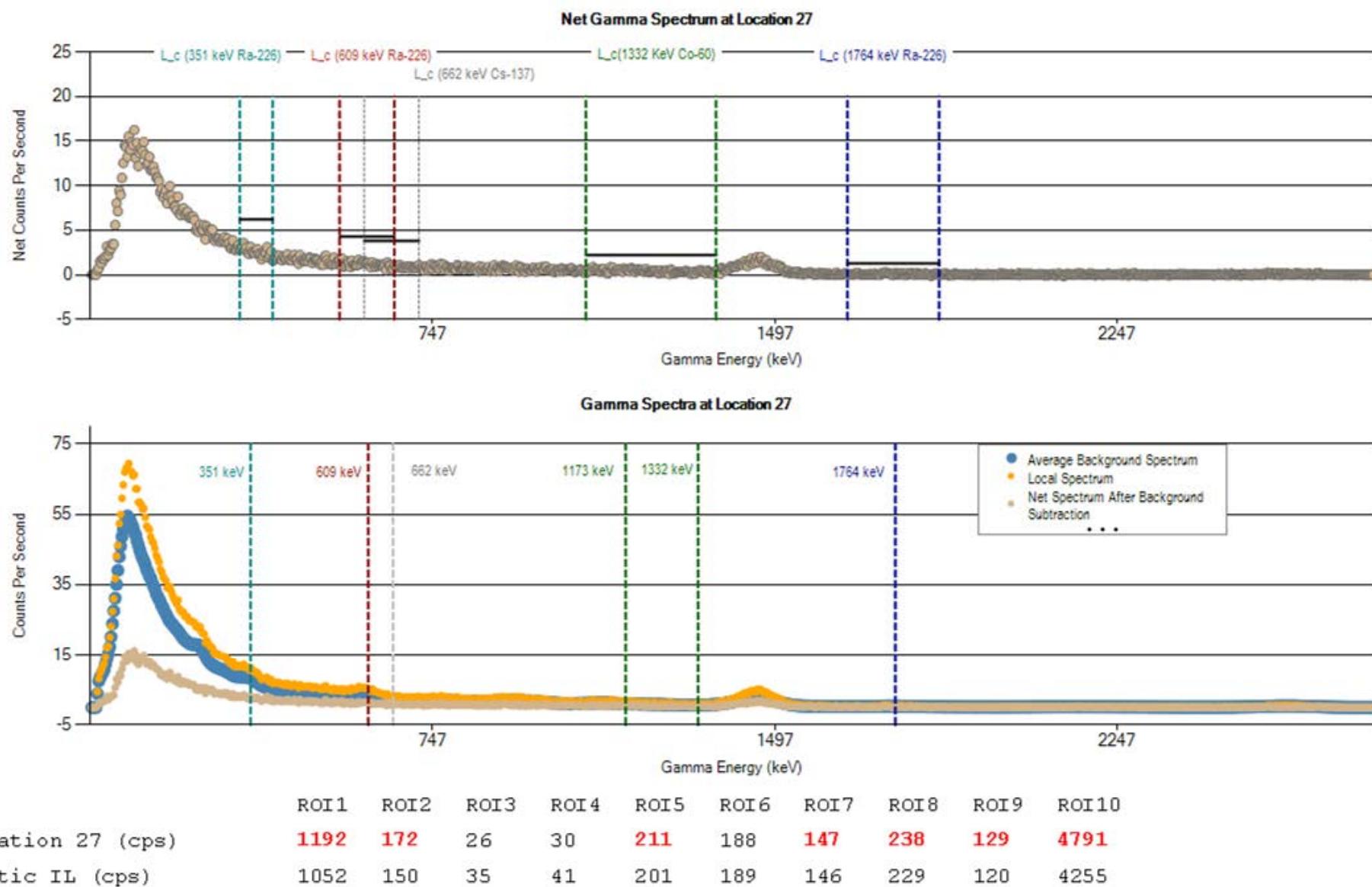


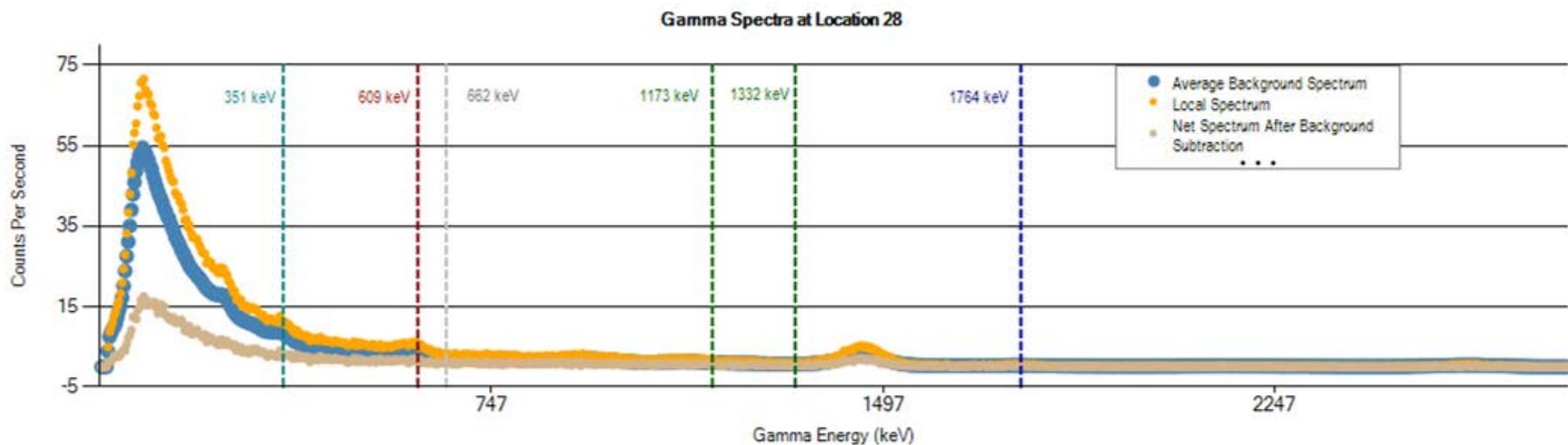
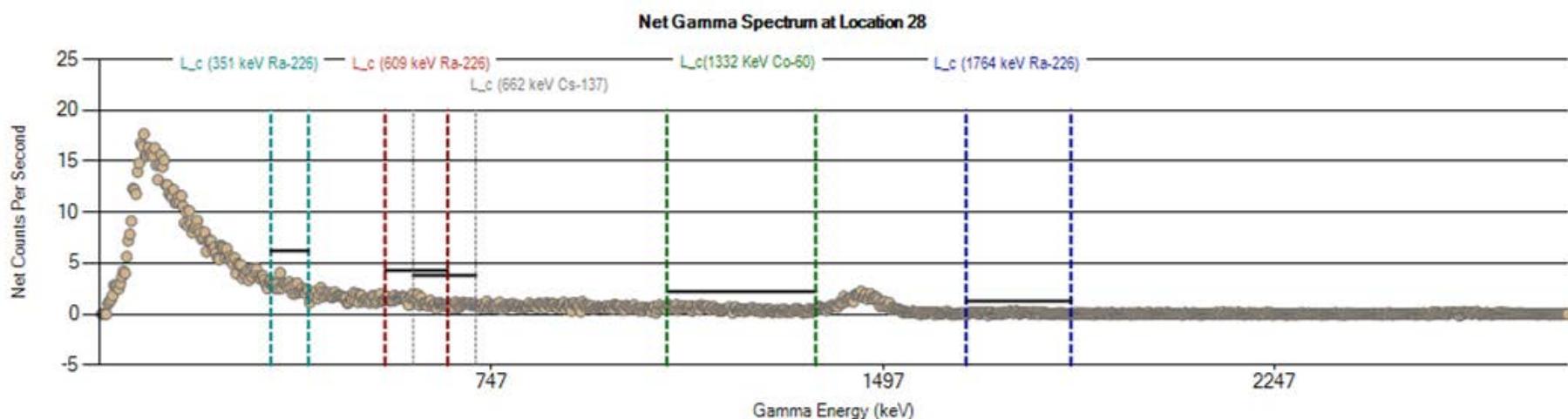
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Location 24 (cps)	1282	188	31	33	221	203	156	255	137	5100
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



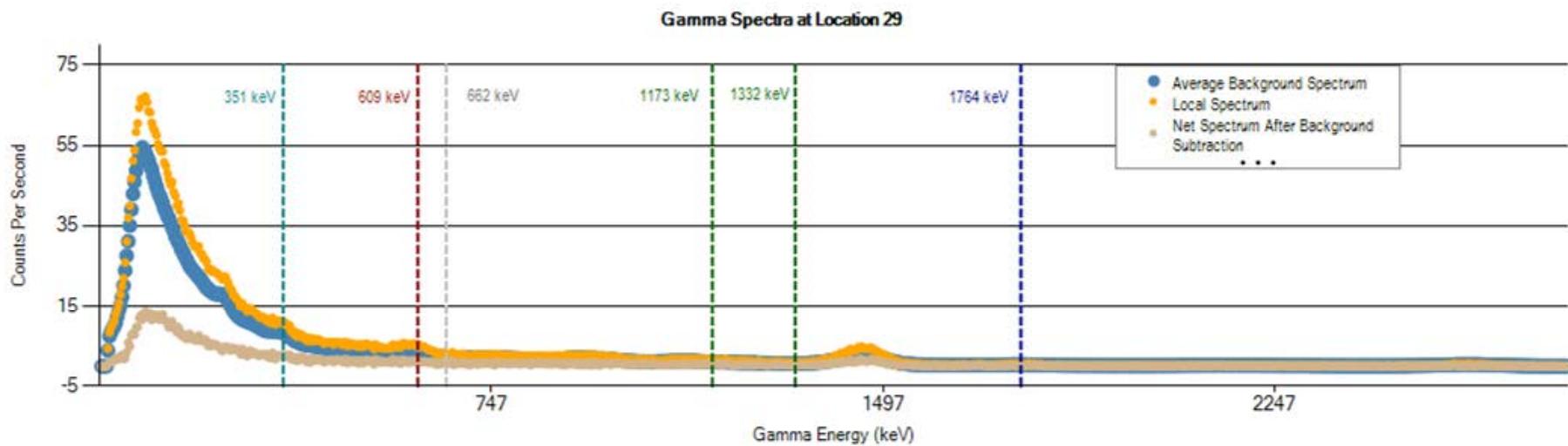
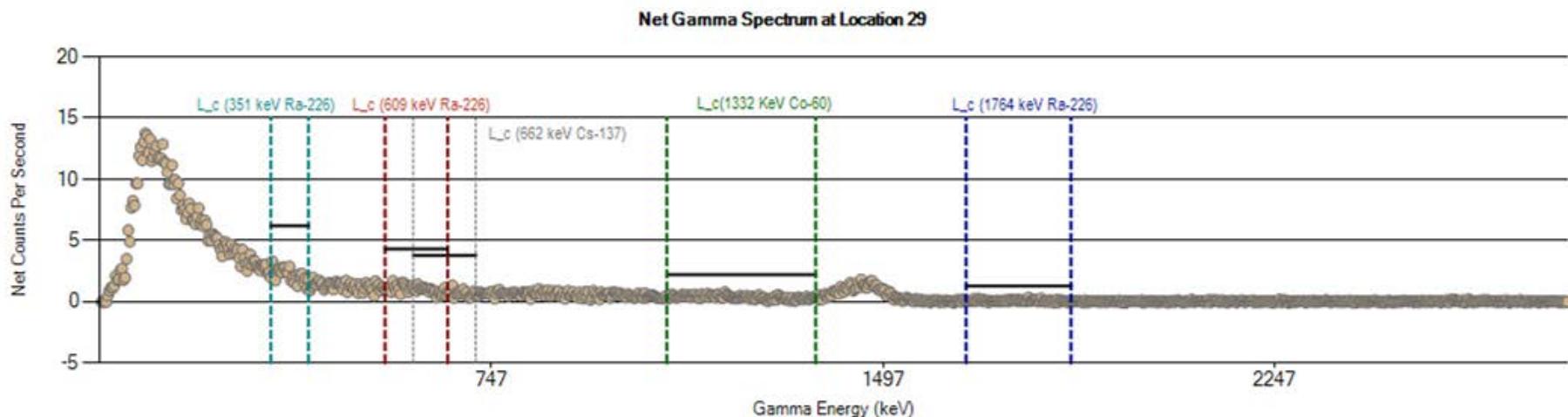


	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 26 (cps)	1243	181	28	31	217	196	153	250	136	4950
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

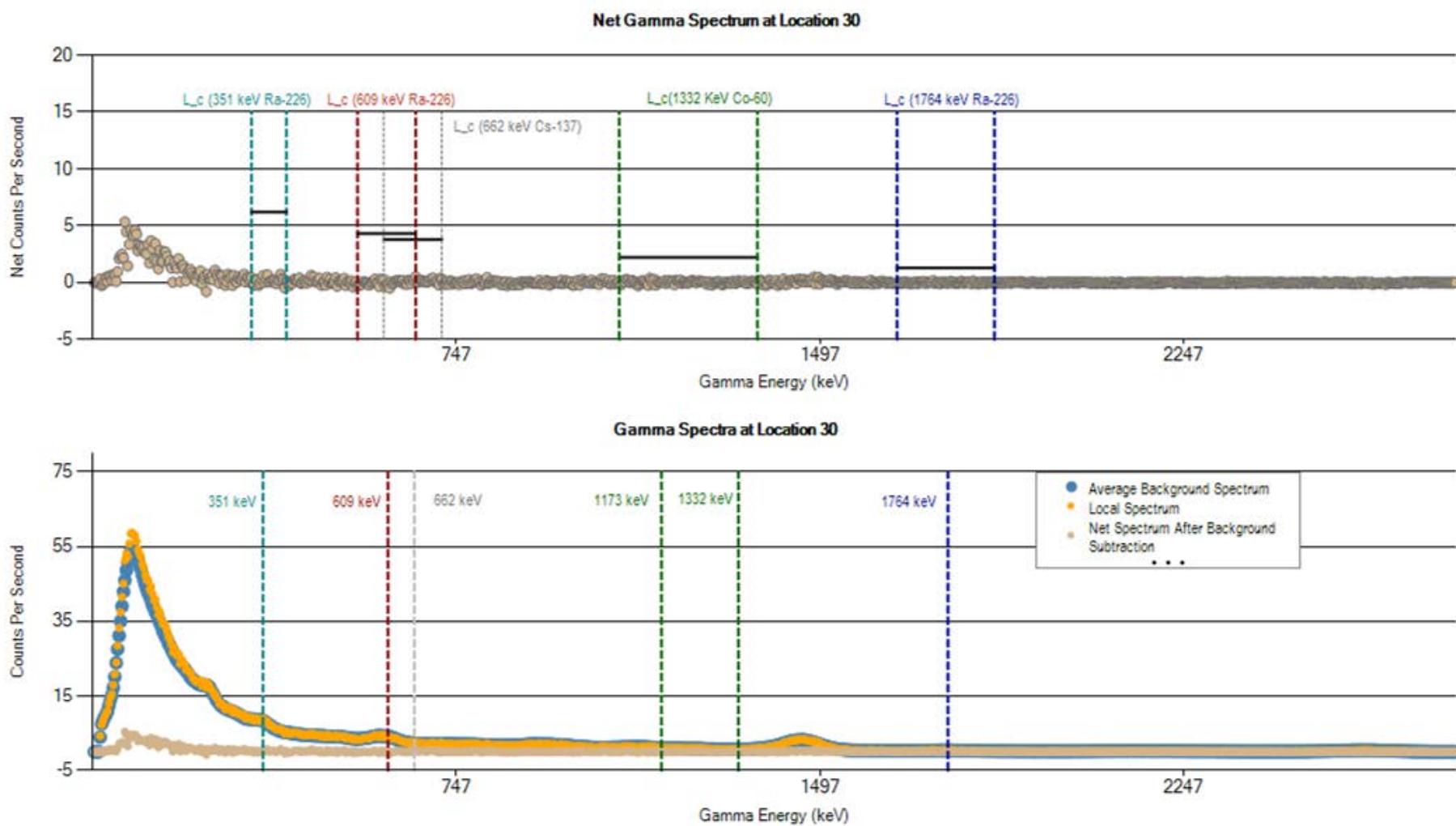




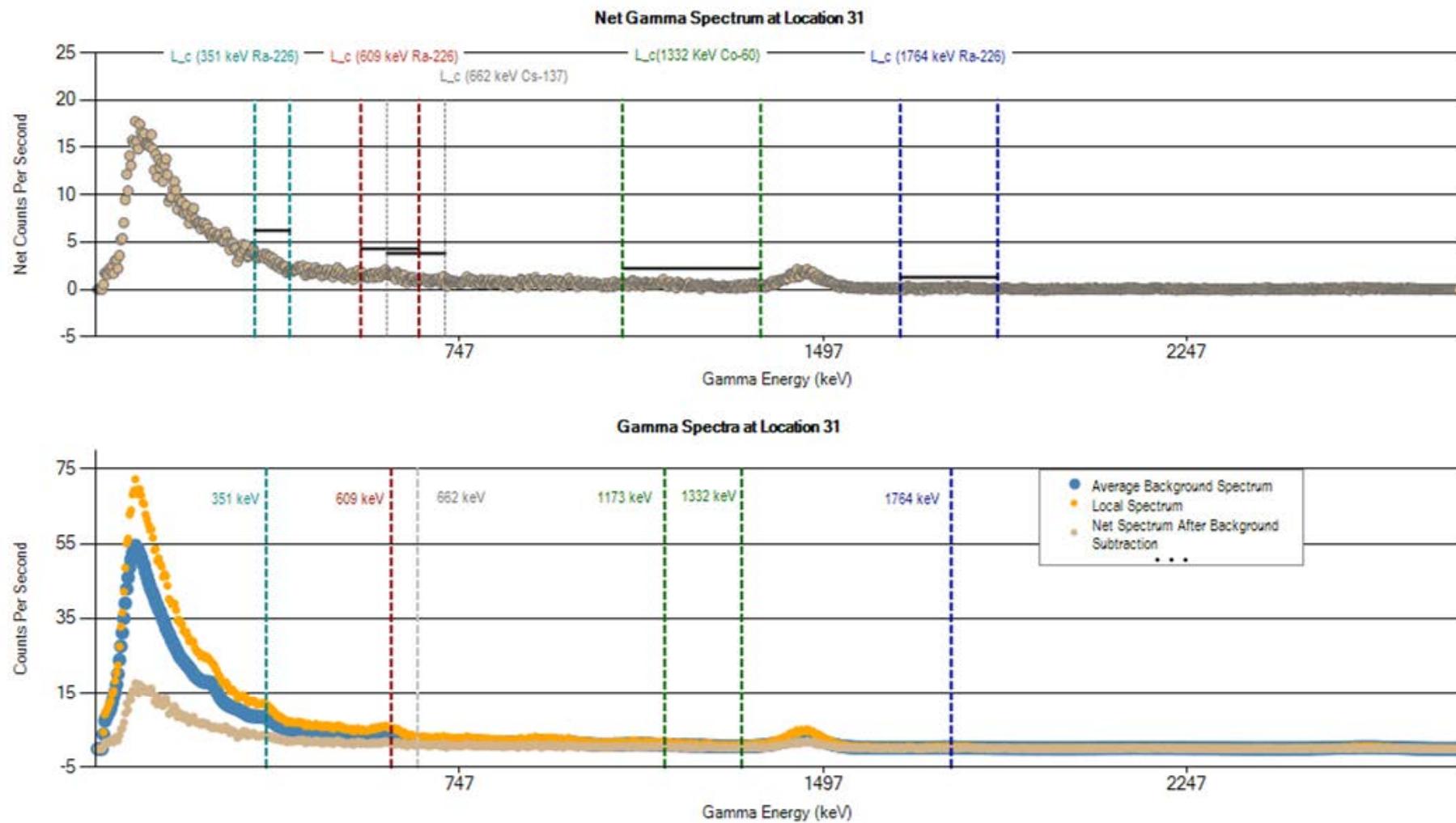
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 28 (cps)	1216	178	27	29	211	193	149	240	133	4878
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



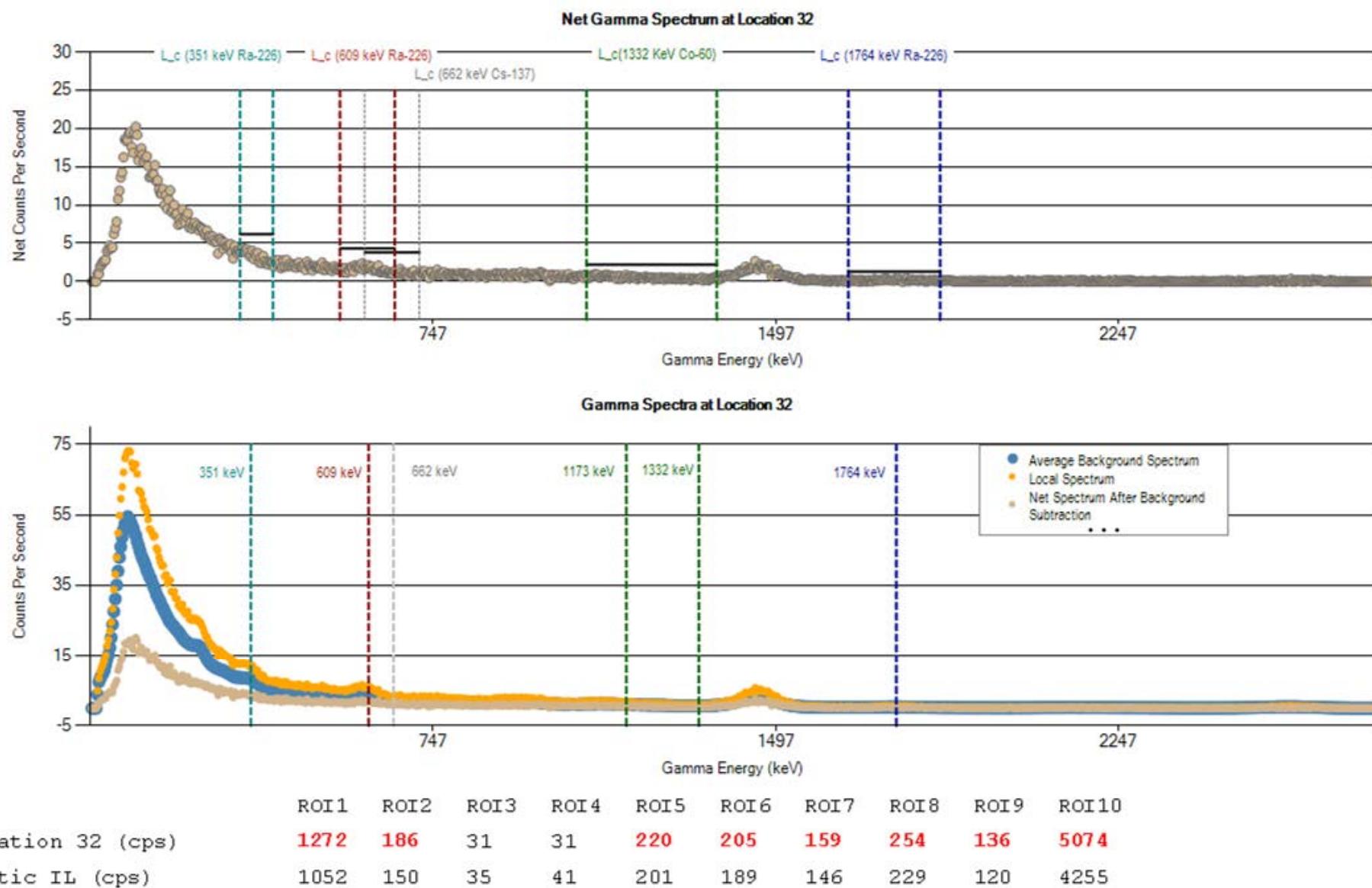
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 29 (cps)	1140	165	27	28	198	182	140	228	124	4614
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

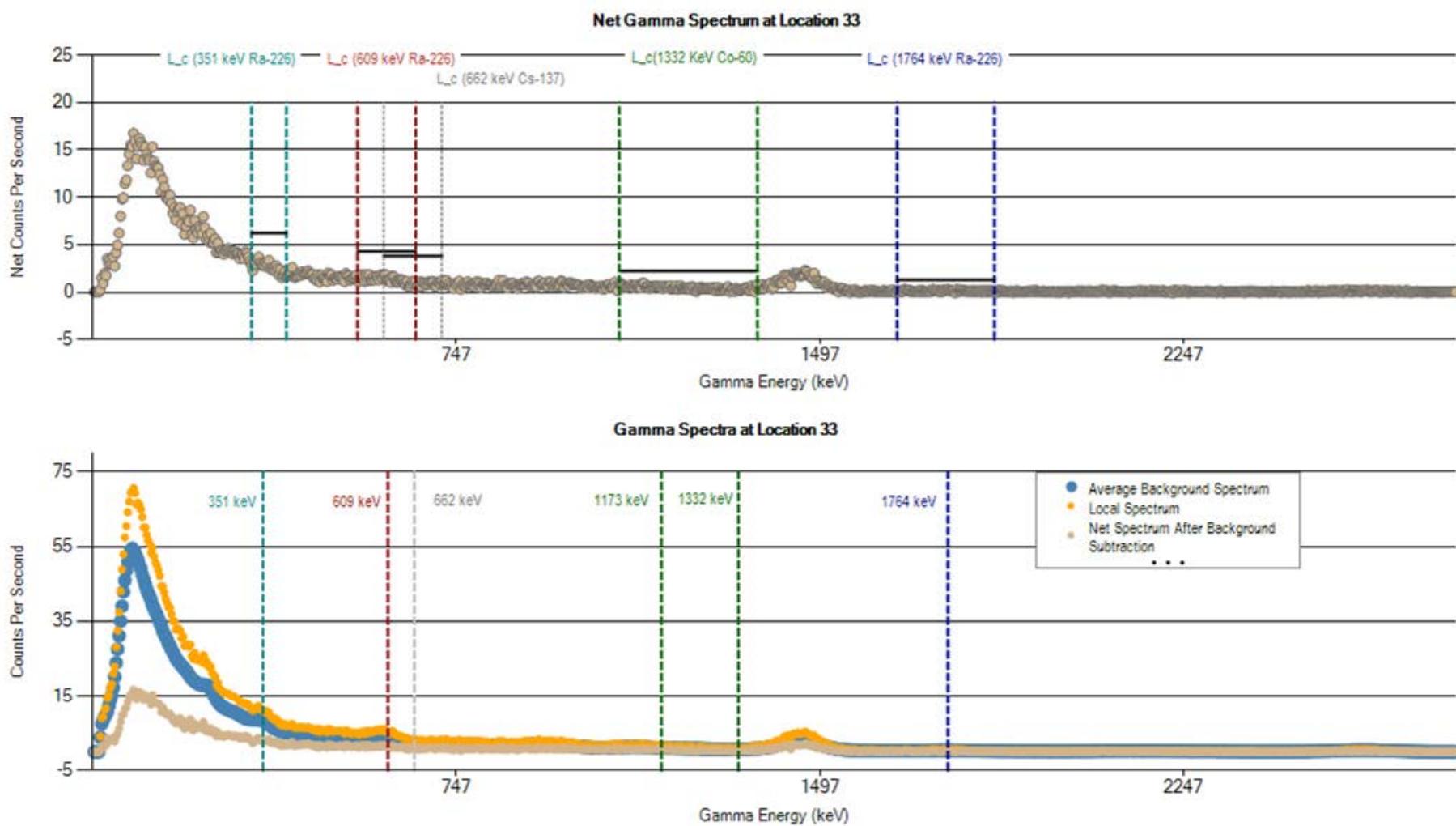


	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 30 (cps)	868	120	21	22	152	141	110	178	92	3768
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 31 (cps)	1225	176	29	32	215	197	153	246	132	4907
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255





	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 33 (cps)	1218	179	28	31	210	193	149	239	131	4862
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

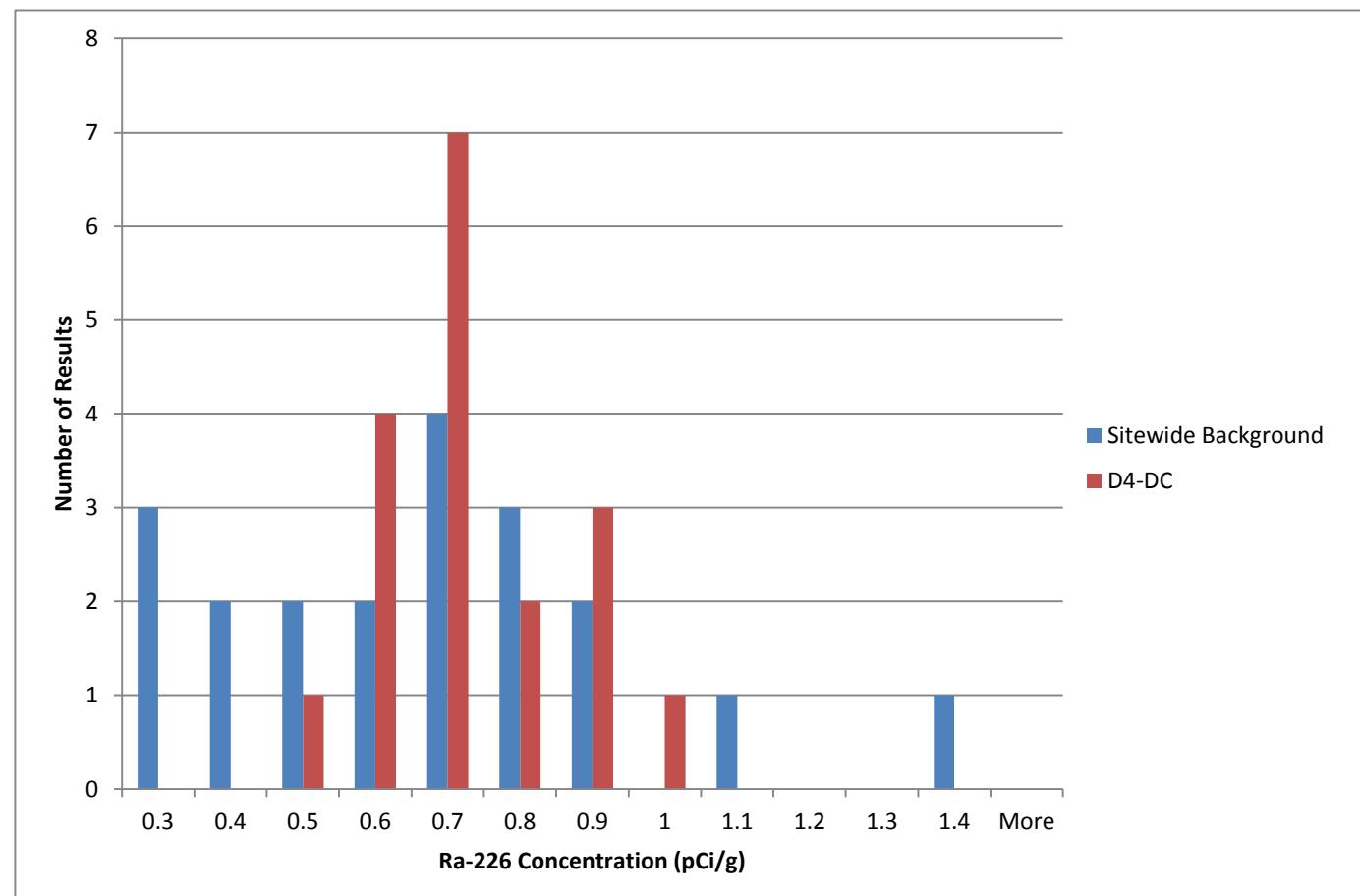
Histogram, RSY D4 (DC) vs. Sitewide Background

Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

D4-DC

Bin	Frequency
0.3	0
0.4	0
0.5	1
0.6	4
0.7	7
0.8	2
0.9	3
1	1
1.1	0
1.2	0
1.3	0
1.4	0
More	0



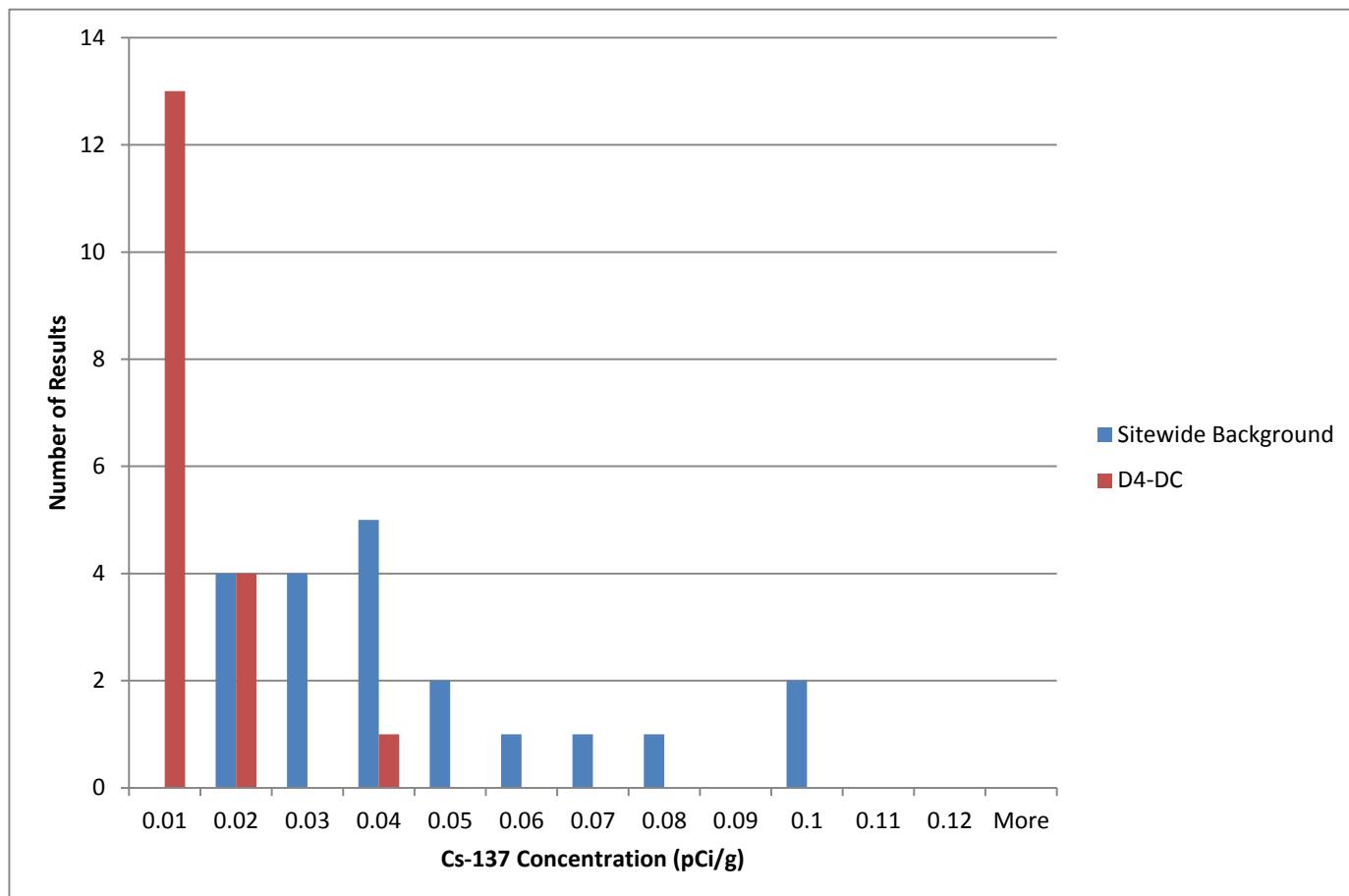
Histogram, RSY D4 (DC) vs. Sitewide Background

Background

Bin	Frequency
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

D4-DC

Bin	Frequency
0.01	13
0.02	4
0.03	0
0.04	1
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-29929-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:

8/29/2018 4:50:34 PM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Job ID: 160-29929-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-29929-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Job ID: 160-29929-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 08/02/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0 C.

TOTAL BETA STRONTIUM (GFPC)

Samples PE2-RSYD4-DC-S001 (160-29929-1) and PE2-RSYD4-DC-S011 (160-29929-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 08/02/2018, prepared on 08/07/2018 and analyzed on 08/23/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYD4-DC-S001 (160-29929-1) and PE2-RSYD4-DC-S011 (160-29929-11). The samples contained detritus material and rocks of varying sizes.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYD4-DC-S001 (160-29929-1), PE2-RSYD4-DC-S002 (160-29929-2), PE2-RSYD4-DC-S003 (160-29929-3), PE2-RSYD4-DC-S004 (160-29929-4), PE2-RSYD4-DC-S005 (160-29929-5), PE2-RSYD4-DC-S006 (160-29929-6), PE2-RSYD4-DC-S007 (160-29929-7), PE2-RSYD4-DC-S008 (160-29929-8), PE2-RSYD4-DC-S009 (160-29929-9), PE2-RSYD4-DC-S010 (160-29929-10), PE2-RSYD4-DC-S011 (160-29929-11), PE2-RSYD4-DC-S012 (160-29929-12), PE2-RSYD4-DC-S013 (160-29929-13), PE2-RSYD4-DC-S014 (160-29929-14), PE2-RSYD4-DC-S015 (160-29929-15), PE2-RSYD4-DC-S016 (160-29929-16), PE2-RSYD4-DC-S017 (160-29929-17) and PE2-RSYD4-DC-S018 (160-29929-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/02/2018, prepared on 08/06/2018 and analyzed on 08/27/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

PE2-RSYD4-DC-S005 (160-29929-5), PE2-RSYD4-DC-S007 (160-29929-7), PE2-RSYD4-DC-S010 (160-29929-10) and PE2-RSYD4-DC-S016 (160-29929-16)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU: PE2-RSYD4-DC-S005 (160-29929-5) This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Ref. Document #		PE2_RSYD4_DC#568																																																																																																																																																																																																																																					
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PE2-RSYD4-DC-S009	Parcel E-2 RSYD4 Deconstruction Systematic	7/21/18	i334	G	SO	1	16 oz. plastic jar																																																																																																																																																																																																																																
PE2-RSYD4-DC-S010	Parcel E-2 RSYD4 Deconstruction Systematic	7/21/18	i338	G	SO	1	16 oz. plastic jar																																																																																																																																																																																																																																
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CHAIN OF CUSTODY

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 500506

CTO-013 RSYD4 Deconstruction

Systematic

Project Name:

Project Location: HPNS - Parcel E-2

Purchase Order #: 202296

Project Manager: Nels Johnson

(Name & phone #)

Send Report To: Eddie Kalombo

Phone/Fax Number: 415-987-0760

Address: 4005 Port Chicago Hwy

City: Concord, CA, 94520

Sampler's Name(s): Dawn Laramée

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Address: 4005 Port Chicago Hwy

City: Concord, CA, 94520

Analyses Requested									
Strontium 90 (EPA 905 MOD)									
Gamma Spec (EPA 1911 M) - (7 day in-growth for full gamma results and full 21 day in-growth for full growth for full gamma results)									
Total Strontium (EPA 905 MOD)									
Dose Rate μR/Hr									

7 days ingrown draft and follow with 21 days final.

Level Of QC Required:

24-hr

3-day

0-day

I II III Project Specific:

Received By: Dawn Laramée

Date: 07/27/18

Time: 1:00pm

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

Standard TAT -10-day	Method Codes	Matrix Codes
<input type="checkbox"/>	C = Composite	DW = Drinking Water
<input type="checkbox"/>	SL = Sludge	GW = Ground Water
<input type="checkbox"/>	CP = Chip Samples	WW = Waste Water
<input type="checkbox"/>	A = Air	ABS=Asbestos, PD=Pipe Opening

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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-29929-2

Login Number: 29929**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation

These commonly used abbreviations may or may not be present in this report.

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29929-1	PE2-RSYD4-DC-S001	Solid	07/27/18 13:06	08/02/18 08:30
160-29929-2	PE2-RSYD4-DC-S002	Solid	07/27/18 13:10	08/02/18 08:30
160-29929-3	PE2-RSYD4-DC-S003	Solid	07/27/18 13:13	08/02/18 08:30
160-29929-4	PE2-RSYD4-DC-S004	Solid	07/27/18 13:16	08/02/18 08:30
160-29929-5	PE2-RSYD4-DC-S005	Solid	07/27/18 13:19	08/02/18 08:30
160-29929-6	PE2-RSYD4-DC-S006	Solid	07/27/18 13:22	08/02/18 08:30
160-29929-7	PE2-RSYD4-DC-S007	Solid	07/27/18 13:26	08/02/18 08:30
160-29929-8	PE2-RSYD4-DC-S008	Solid	07/27/18 13:30	08/02/18 08:30
160-29929-9	PE2-RSYD4-DC-S009	Solid	07/27/18 13:34	08/02/18 08:30
160-29929-10	PE2-RSYD4-DC-S010	Solid	07/27/18 13:38	08/02/18 08:30
160-29929-11	PE2-RSYD4-DC-S011	Solid	07/27/18 13:42	08/02/18 08:30
160-29929-12	PE2-RSYD4-DC-S012	Solid	07/27/18 13:46	08/02/18 08:30
160-29929-13	PE2-RSYD4-DC-S013	Solid	07/27/18 13:49	08/02/18 08:30
160-29929-14	PE2-RSYD4-DC-S014	Solid	07/27/18 13:52	08/02/18 08:30
160-29929-15	PE2-RSYD4-DC-S015	Solid	07/27/18 13:55	08/02/18 08:30
160-29929-16	PE2-RSYD4-DC-S016	Solid	07/27/18 13:58	08/02/18 08:30
160-29929-17	PE2-RSYD4-DC-S017	Solid	07/27/18 14:01	08/02/18 08:30
160-29929-18	PE2-RSYD4-DC-S018	Solid	07/27/18 14:06	08/02/18 08:30

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S001**Lab Sample ID: 160-29929-1**

Date Collected: 07/27/18 13:06

Matrix: Solid

Date Received: 08/02/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.000	U	0.0554	0.0554	0.331	0.0456	pCi/g	08/07/18 18:44	08/23/18 06:01	1
<i>Carrier</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>	87.9		40 - 110					08/07/18 18:44	08/23/18 06:01	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.766		0.326	0.336		0.201	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Actinium-227	0.243	U	0.532	0.533		0.510	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Bismuth-212	0.444	U	0.799	0.801		0.609	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Bismuth-214	0.927		0.206	0.228		0.0677	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Cesium-137	0.0215	U	0.0808	0.0808	0.0700	0.0645	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Cobalt-60	0.0130	U	0.120	0.120	0.200	0.0608	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Lead-210	-0.112	U	1.62	1.62		1.14	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Lead-212	0.804		0.130	0.166		0.0599	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Lead-214	0.772		0.131	0.154		0.0652	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Potassium-40	17.0		2.16	2.77		0.312	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Protactinium-231	-0.304	U	3.11	3.11		2.55	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Radium-226	0.927		0.206	0.228	0.700	0.0677	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Radium-228	0.766		0.326	0.336		0.201	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Thallium-208	0.324		0.0859	0.0923		0.0254	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Thorium-228	0.804		0.130	0.166		0.0599	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Thorium-232	0.766		0.326	0.336		0.201	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Thorium-234	0.847		0.917	0.921		0.695	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Uranium-235	-0.169	U	0.342	0.342		0.332	pCi/g	08/06/18 13:23	08/27/18 01:46	1
Uranium-238	0.847		0.917	0.921		0.695	pCi/g	08/06/18 13:23	08/27/18 01:46	1

Client Sample ID: PE2-RSYD4-DC-S002**Lab Sample ID: 160-29929-2**

Date Collected: 07/27/18 13:10

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.189		0.246	0.247		0.156	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Actinium-227	0.301	U	0.926	0.927		0.751	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Bismuth-212	-0.0312	U	0.560	0.560		0.677	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Bismuth-214	0.477		0.141	0.149		0.0646	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Cesium-137	-0.0500	U	0.0818	0.0819	0.0700	0.0632	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Cobalt-60	-0.0320	U	0.121	0.121	0.200	0.0458	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Lead-210	1.64		1.77	1.78		1.11	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Lead-212	0.336		0.0977	0.104		0.0562	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Lead-214	0.591		0.145	0.157		0.0542	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Potassium-40	7.36		1.40	1.58		0.386	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Protactinium-231	-1.01	U	3.56	3.56		2.90	pCi/g	08/06/18 13:23	08/27/18 02:16	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S002**Lab Sample ID: 160-29929-2**

Date Collected: 07/27/18 13:10

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.477		0.141	0.149	0.700	0.0646	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Radium-228	0.189		0.246	0.247		0.156	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Thallium-208	0.158		0.108	0.109		0.0475	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Thorium-228	0.336		0.0977	0.104		0.0562	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Thorium-232	0.189		0.246	0.247		0.156	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Thorium-234	1.14		0.645	0.658		0.644	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Uranium-235	0.408		0.256	0.260		0.182	pCi/g	08/06/18 13:23	08/27/18 02:16	1
Uranium-238	1.14		0.645	0.658		0.644	pCi/g	08/06/18 13:23	08/27/18 02:16	1

Client Sample ID: PE2-RSYD4-DC-S003**Lab Sample ID: 160-29929-3**

Date Collected: 07/27/18 13:13

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.700		0.250	0.260		0.168	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Actinium-227	-0.365	U	0.798	0.799		0.538	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Bismuth-212	0.643	U	1.16	1.16		0.905	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Bismuth-214	0.641		0.172	0.185		0.0622	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Cesium-137	0.00368	U	0.0715	0.0715	0.0700	0.0584	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Cobalt-60	-0.0111	U	0.101	0.101	0.200	0.0508	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Lead-210	0.741	U	1.50	1.50		0.962	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Lead-212	0.713		0.120	0.151		0.0512	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Lead-214	0.695		0.164	0.180		0.0644	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Potassium-40	11.3		1.80	2.14		0.319	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Protactinium-231	0.000	U	1.02	1.02		2.39	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Radium-226	0.641		0.172	0.185	0.700	0.0622	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Radium-228	0.700		0.250	0.260		0.168	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Thallium-208	0.255		0.0798	0.0841		0.0237	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Thorium-228	0.713		0.120	0.151		0.0512	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Thorium-232	0.700		0.250	0.260		0.168	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Thorium-234	1.62		1.05	1.06		0.765	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Uranium-235	-0.191	U	0.393	0.393		0.381	pCi/g	08/06/18 13:23	08/27/18 02:21	1
Uranium-238	1.62		1.05	1.06		0.765	pCi/g	08/06/18 13:23	08/27/18 02:21	1

Client Sample ID: PE2-RSYD4-DC-S004**Lab Sample ID: 160-29929-4**

Date Collected: 07/27/18 13:16

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.04		0.246	0.268		0.0389	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Actinium-227	-0.609	U	1.26	1.27		1.02	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Bismuth-212	0.351	U	0.844	0.845		0.658	pCi/g	08/06/18 13:23	08/27/18 02:20	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S004

Date Collected: 07/27/18 13:16

Date Received: 08/02/18 08:30

Lab Sample ID: 160-29929-4

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.996		0.215	0.239		0.0655	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Cesium-137	0.00734	U	0.0667	0.0667	0.0700	0.0537	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Cobalt-60	0.00715	U	0.0251	0.0251	0.200	0.0580	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Lead-210	1.15	U	2.15	2.15		1.72	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Lead-212	0.816		0.136	0.172		0.0645	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Lead-214	1.05		0.167	0.199		0.0747	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Potassium-40	9.66		2.07	2.30		0.705	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Protactinium-231	0.378	U	1.95	1.95		3.01	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Radium-226	0.996		0.215	0.239	0.700	0.0655	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Radium-228	1.04		0.246	0.268		0.0389	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Thallium-208	0.370		0.0802	0.0889		0.0188	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Thorium-228	0.816		0.136	0.172		0.0645	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Thorium-232	1.04		0.246	0.268		0.0389	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Thorium-234	0.0255	U	0.153	0.153		1.67	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Uranium-235	-0.330	U	0.885	0.885		0.611	pCi/g	08/06/18 13:23	08/27/18 02:20	1
Uranium-238	0.0255	U	0.153	0.153		1.67	pCi/g	08/06/18 13:23	08/27/18 02:20	1

Client Sample ID: PE2-RSYD4-DC-S005

Date Collected: 07/27/18 13:19

Date Received: 08/02/18 08:30

Lab Sample ID: 160-29929-5

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.925		0.375	0.386		0.149	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Actinium-227	0.435	U	0.988	0.990		0.796	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Bismuth-212	0.315	U	1.14	1.14		0.915	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Bismuth-214	0.736		0.164	0.180		0.0493	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Cesium-137	-0.0577	U	0.102	0.103	0.0700	0.0801	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Cobalt-60	-0.00310	U	0.0111	0.0111	0.200	0.0618	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Lead-210	-3.24	U	1.86	1.91		2.29	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Lead-212	0.709		0.131	0.150		0.0631	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Lead-214	0.947		0.169	0.194		0.0487	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Potassium-40	17.4		2.18	2.80		0.426	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Protactinium-231	0.000	U	1.34	1.34		3.19	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Radium-226	0.736		0.164	0.180	0.700	0.0493	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Radium-228	0.925		0.375	0.386		0.149	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Thallium-208	0.341		0.0887	0.0952		0.0278	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Thorium-228	0.709		0.131	0.150		0.0631	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Thorium-232	0.925		0.375	0.386		0.149	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Thorium-234	-0.784	U	1.40	1.40		1.91	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Uranium-235	-0.0562	U	0.111	0.112		0.790	pCi/g	08/06/18 13:23	08/27/18 02:53	1
Uranium-238	-0.784	U	1.40	1.40		1.91	pCi/g	08/06/18 13:23	08/27/18 02:53	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S006

Date Collected: 07/27/18 13:22

Date Received: 08/02/18 08:30

Lab Sample ID: 160-29929-6

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium 228	0.951		0.214	0.235		0.0346	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Actinium-227	-0.459	U		1.01	1.01	0.818	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Bismuth-212	-0.00166	U		0.754	0.754	0.762	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Bismuth-214	0.627		0.135	0.150		0.0313	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Cesium-137	-0.0173	U		0.0616	0.0616	0.0700	0.0521	pCi/g	08/06/18 13:23	08/27/18 02:56	1
Cobalt-60	0.0377	U		0.0307	0.0309	0.200	0.0405	pCi/g	08/06/18 13:23	08/27/18 02:56	1
Lead-210	-1.02	U		1.37	1.38		1.44	pCi/g	08/06/18 13:23	08/27/18 02:56	1
Lead-212	0.571		0.115	0.137		0.0614	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Lead-214	0.586		0.117	0.132		0.0532	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Potassium-40	12.5		1.77	2.18		0.276	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Protactinium-231	0.000	U		0.787	0.787		2.55	pCi/g	08/06/18 13:23	08/27/18 02:56	1
Radium-226	0.627		0.135	0.150	0.700	0.0313	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Radium-228	0.951		0.214	0.235		0.0346	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Thallium-208	0.319		0.0704	0.0778		0.0168	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Thorium-228	0.571		0.115	0.137		0.0614	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Thorium-232	0.951		0.214	0.235		0.0346	pCi/g	08/06/18 13:23	08/27/18 02:56	1	
Thorium-234	-0.415	U		1.72	1.72		1.43	pCi/g	08/06/18 13:23	08/27/18 02:56	1
Uranium-235	-0.0226	U		0.267	0.267		0.537	pCi/g	08/06/18 13:23	08/27/18 02:56	1
Uranium-238	-0.415	U		1.72	1.72		1.43	pCi/g	08/06/18 13:23	08/27/18 02:56	1

Client Sample ID: PE2-RSYD4-DC-S007

Date Collected: 07/27/18 13:26

Date Received: 08/02/18 08:30

Lab Sample ID: 160-29929-7

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium 228	0.961		0.243	0.262		0.0442	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Actinium-227	-0.0472	U		0.0944	0.0946		0.593	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Bismuth-212	2.11		0.714	0.747		0.141	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Bismuth-214	0.945		0.185	0.209		0.0353	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Cesium-137	-0.0549	U		0.0954	0.0956	0.0700	0.0738	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Cobalt-60	-0.00253	U		0.0800	0.0800	0.200	0.0408	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Lead-210	-0.185	U		1.93	1.93		1.36	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Lead-212	0.747		0.141	0.171		0.0708	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Lead-214	0.832		0.197	0.215		0.0757	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Potassium-40	13.6		2.09	2.51		0.362	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Protactinium-231	0.466	U		1.82	1.82		2.85	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Radium-226	0.945		0.185	0.209	0.700	0.0353	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Radium-228	0.961		0.243	0.262		0.0442	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Thallium-208	0.238		0.0901	0.0934		0.0362	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Thorium-228	0.747		0.141	0.171		0.0708	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Thorium-232	0.961		0.243	0.262		0.0442	pCi/g	08/06/18 13:23	08/27/18 02:54	1	
Thorium-234	0.882	U		0.596	0.603		0.886	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Uranium-235	0.186	U		0.430	0.431		0.350	pCi/g	08/06/18 13:23	08/27/18 02:54	1
Uranium-238	0.882	U		0.596	0.603		0.886	pCi/g	08/06/18 13:23	08/27/18 02:54	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S008

Date Collected: 07/27/18 13:30

Date Received: 08/02/18 08:30

Lab Sample ID: 160-29929-8

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.470		0.163	0.170		0.133	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Actinium-227	0.0946	U	0.590	0.590		0.404	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Bismuth-212	0.212	U	0.754	0.755		0.601	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Bismuth-214	0.558		0.146	0.157		0.0533	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Cesium-137	-0.0251	U	0.0844	0.0844	0.0700	0.0533	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Cobalt-60	0.00577	U	0.0611	0.0611	0.200	0.0400	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Lead-210	0.900		1.28	1.28		0.867	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Lead-212	0.229		0.0948	0.0993		0.0646	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Lead-214	0.603		0.116	0.132		0.0448	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Potassium-40	7.39		1.29	1.49		0.239	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Protactinium-231	-0.825	U	2.71	2.72		2.21	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Radium-226	0.558		0.146	0.157	0.700	0.0533	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Radium-228	0.470		0.163	0.170		0.133	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thallium-208	0.0996		0.0734	0.0741		0.0396	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thorium-228	0.229		0.0948	0.0993		0.0646	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thorium-232	0.470		0.163	0.170		0.133	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thorium-234	0.106	U	1.13	1.13		0.920	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Uranium-235	-0.00911	U	0.289	0.289		0.483	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Uranium-238	0.106	U	1.13	1.13		0.920	pCi/g	08/06/18 13:23	08/27/18 03:25	1

Client Sample ID: PE2-RSYD4-DC-S009

Date Collected: 07/27/18 13:34

Date Received: 08/02/18 08:30

Lab Sample ID: 160-29929-9

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.09		0.294	0.315		0.0730	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Actinium-227	0.449	U	1.00	1.00		0.809	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Bismuth-212	0.499	U	1.02	1.02		0.798	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Bismuth-214	0.598		0.172	0.183		0.0923	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Cesium-137	0.0391	U	0.0759	0.0760	0.0700	0.0590	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Cobalt-60	0.0238	U	0.0561	0.0562	0.200	0.0329	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Lead-210	-0.948	U	2.29	2.29		1.91	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Lead-212	0.810		0.145	0.168		0.0792	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Lead-214	0.755		0.169	0.186		0.0688	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Potassium-40	19.3		2.29	3.01		0.500	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Protactinium-231	0.000	U	1.07	1.07		3.18	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Radium-226	0.598		0.172	0.183	0.700	0.0923	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Radium-228	1.09		0.294	0.315		0.0730	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thallium-208	0.336		0.0995	0.105		0.0385	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thorium-228	0.810		0.145	0.168		0.0792	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thorium-232	1.09		0.294	0.315		0.0730	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Thorium-234	0.153	U	2.01	2.01		1.65	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Uranium-235	-0.132	U	0.820	0.820		0.672	pCi/g	08/06/18 13:23	08/27/18 03:25	1
Uranium-238	0.153	U	2.01	2.01		1.65	pCi/g	08/06/18 13:23	08/27/18 03:25	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S010**Lab Sample ID: 160-29929-10**

Date Collected: 07/27/18 13:38

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.708		0.323	0.331		0.127	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Actinium-227	0.131	U	0.281	0.281		0.512	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Bismuth-212	-0.0189	U	1.11	1.11		0.910	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Bismuth-214	0.692		0.167	0.182		0.0482	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Cesium-137	0.0182	U	0.0960	0.0960	0.0700	0.0774	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Cobalt-60	-0.00631	U	0.0294	0.0294	0.200	0.0664	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Lead-210	0.653	U	1.45	1.45		0.996	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Lead-212	0.774		0.135	0.168		0.0638	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Lead-214	0.648		0.130	0.147		0.0634	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Potassium-40	15.3		2.14	2.65		0.340	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Protactinium-231	0.000	U	0.929	0.929		2.74	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Radium-226	0.692		0.167	0.182	0.700	0.0482	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Radium-228	0.708		0.323	0.331		0.127	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Thallium-208	0.252		0.0817	0.0858		0.0266	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Thorium-228	0.774		0.135	0.168		0.0638	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Thorium-232	0.708		0.323	0.331		0.127	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Thorium-234	0.737	U	0.681	0.685		0.861	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Uranium-235	0.135	U	0.340	0.340		0.273	pCi/g	08/06/18 13:23	08/27/18 03:30	1
Uranium-238	0.737	U	0.681	0.685		0.861	pCi/g	08/06/18 13:23	08/27/18 03:30	1

Client Sample ID: PE2-RSYD4-DC-S011**Lab Sample ID: 160-29929-11**

Date Collected: 07/27/18 13:42

Matrix: Solid

Date Received: 08/02/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0608		0.0686	0.0687	0.331	0.0515	pCi/g	08/07/18 18:44	08/23/18 06:01	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	87.2		40 - 110							
							Prepared		Analyzed	Dil Fac
							08/07/18 18:44		08/23/18 06:01	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.788		0.201	0.217		0.0620	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Actinium-227	0.288	U	0.703	0.704		0.569	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Bismuth-212	-0.0173	U	0.769	0.769		0.632	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Bismuth-214	0.723		0.128	0.149		0.0244	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Cesium-137	0.000939	U	0.0597	0.0597	0.0700	0.0491	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Cobalt-60	0.0136	U	0.0532	0.0532	0.200	0.0257	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Lead-210	0.197	U	1.60	1.60		1.31	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Lead-212	0.545		0.0988	0.121		0.0567	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Lead-214	0.723		0.123	0.145		0.0532	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Potassium-40	15.5		1.71	2.33		0.185	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Protactinium-231	0.325	U	1.35	1.35		2.12	pCi/g	08/06/18 13:23	08/27/18 03:29	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S011**Lab Sample ID: 160-29929-11**

Date Collected: 07/27/18 13:42

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.723		0.128	0.149	0.700	0.0244	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Radium-228	0.788		0.201	0.217		0.0620	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Thallium-208	0.194		0.0769	0.0795		0.0339	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Thorium-228	0.545		0.0988	0.121		0.0567	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Thorium-232	0.788		0.201	0.217		0.0620	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Thorium-234	0.176 U		1.19	1.19		0.976	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Uranium-235	0.125 U		0.416	0.416		0.340	pCi/g	08/06/18 13:23	08/27/18 03:29	1
Uranium-238	0.176 U		1.19	1.19		0.976	pCi/g	08/06/18 13:23	08/27/18 03:29	1

Client Sample ID: PE2-RSYD4-DC-S012**Lab Sample ID: 160-29929-12**

Date Collected: 07/27/18 13:46

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.818		0.168	0.187		0.0338	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Actinium-227	-0.434 U		0.881	0.882		0.708	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Bismuth-212	-0.590 U		0.619	0.622		0.834	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Bismuth-214	0.671		0.139	0.156		0.0305	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Cesium-137	0.00638 U		0.0506	0.0506	0.0700	0.0404	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Cobalt-60	-0.00743 U		0.0368	0.0368	0.200	0.0504	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Lead-210	0.106 U		1.46	1.46		1.20	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Lead-212	0.475		0.0913	0.110		0.0372	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Lead-214	0.521		0.107	0.120		0.0508	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Potassium-40	9.23		1.51	1.78		0.269	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Protactinium-231	0.540 U		2.06	2.06		2.41	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Radium-226	0.671		0.139	0.156	0.700	0.0305	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Radium-228	0.818		0.168	0.187		0.0338	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Thallium-208	0.150		0.0608	0.0628		0.0247	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Thorium-228	0.475		0.0913	0.110		0.0372	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Thorium-232	0.818		0.168	0.187		0.0338	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Thorium-234	0.174 U		0.244	0.245		1.26	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Uranium-235	-0.0534 U		0.673	0.673		0.416	pCi/g	08/06/18 13:23	08/27/18 03:28	1
Uranium-238	0.174 U		0.244	0.245		1.26	pCi/g	08/06/18 13:23	08/27/18 03:28	1

Client Sample ID: PE2-RSYD4-DC-S013**Lab Sample ID: 160-29929-13**

Date Collected: 07/27/18 13:49

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.844		0.166	0.187		0.0524	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Actinium-227	0.289 U		0.380	0.381		0.461	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Bismuth-212	0.000 U		0.530	0.530		0.551	pCi/g	08/06/18 13:23	08/27/18 04:10	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S013**Lab Sample ID: 160-29929-13**

Date Collected: 07/27/18 13:49

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.694		0.131	0.150		0.0412	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Cesium-137	0.0234	U	0.0635	0.0636	0.0700	0.0509	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Cobalt-60	-0.0257	U	0.0895	0.0895	0.200	0.0434	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Lead-210	-0.408	U	0.863	0.864		1.31	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Lead-212	0.641		0.0942	0.125		0.0452	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Lead-214	0.587		0.100	0.117		0.0537	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Potassium-40	13.8		1.42	2.00		0.220	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Protactinium-231	0.000	U	0.745	0.746		2.02	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Radium-226	0.694		0.131	0.150	0.700	0.0412	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Radium-228	0.844		0.166	0.187		0.0524	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thallium-208	0.269		0.0560	0.0626		0.0167	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thorium-228	0.641		0.0942	0.125		0.0452	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thorium-232	0.844		0.166	0.187		0.0524	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thorium-234	0.000	U	0.850	0.850		1.14	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Uranium-235	0.0144	U	0.169	0.169		0.376	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Uranium-238	0.000	U	0.850	0.850		1.14	pCi/g	08/06/18 13:23	08/27/18 04:10	1

Client Sample ID: PE2-RSYD4-DC-S014**Lab Sample ID: 160-29929-14**

Date Collected: 07/27/18 13:52

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.05		0.223	0.247		0.0289	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Actinium-227	0.257	U	0.911	0.911		0.740	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Bismuth-212	0.427	U	0.865	0.867		0.679	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Bismuth-214	0.865		0.180	0.200		0.0583	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Cesium-137	-0.0104	U	0.0695	0.0695	0.0700	0.0564	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Cobalt-60	0.00462	U	0.0164	0.0165	0.200	0.0459	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Lead-210	0.678	U	1.42	1.42		1.02	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Lead-212	0.725		0.110	0.134		0.0468	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Lead-214	0.785		0.192	0.208		0.0825	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Potassium-40	16.0		1.76	2.39		0.112	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Protactinium-231	0.000	U	0.696	0.696		2.74	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Radium-226	0.865		0.180	0.200	0.700	0.0583	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Radium-228	1.05		0.223	0.247		0.0289	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Thallium-208	0.308		0.0851	0.0907		0.0320	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Thorium-228	0.725		0.110	0.134		0.0468	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Thorium-232	1.05		0.223	0.247		0.0289	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Thorium-234	0.614	U	0.630	0.634		0.896	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Uranium-235	-0.0799	U	0.269	0.269		0.540	pCi/g	08/06/18 13:23	08/27/18 04:08	1
Uranium-238	0.614	U	0.630	0.634		0.896	pCi/g	08/06/18 13:23	08/27/18 04:08	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S015**Lab Sample ID: 160-29929-15**

Date Collected: 07/27/18 13:55

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.778		0.271	0.282		0.104	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Actinium-227	-0.113	U	0.731	0.731		0.455	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Bismuth-212	0.920		0.554	0.562		0.268	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Bismuth-214	0.752		0.175	0.192		0.0594	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Cesium-137	-0.000450	U	0.0983	0.0983	0.0700	0.0498	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Cobalt-60	-0.0332	U	0.0899	0.0899	0.200	0.0442	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Lead-210	-0.0649	U	1.54	1.54		1.09	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Lead-212	0.586		0.110	0.133		0.0609	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Lead-214	0.844		0.144	0.169		0.0533	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Potassium-40	16.9		1.82	2.51		0.216	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Protactinium-231	0.000	U	0.750	0.751		2.15	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Radium-226	0.752		0.175	0.192	0.700	0.0594	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Radium-228	0.778		0.271	0.282		0.104	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thallium-208	0.283		0.0644	0.0708		0.0192	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thorium-228	0.586		0.110	0.133		0.0609	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thorium-232	0.778		0.271	0.282		0.104	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Thorium-234	0.249	U	0.649	0.650		0.951	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Uranium-235	0.0363	U	0.385	0.385		0.316	pCi/g	08/06/18 13:23	08/27/18 04:10	1
Uranium-238	0.249	U	0.649	0.650		0.951	pCi/g	08/06/18 13:23	08/27/18 04:10	1

Client Sample ID: PE2-RSYD4-DC-S016**Lab Sample ID: 160-29929-16**

Date Collected: 07/27/18 13:58

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.767		0.284	0.294		0.103	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Actinium-227	0.273	U	0.595	0.596		0.632	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Bismuth-212	-0.0383	U	1.11	1.11		0.473	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Bismuth-214	0.730		0.154	0.172		0.0468	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Cesium-137	-0.0511	U	0.0900	0.0902	0.0700	0.0755	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Cobalt-60	0.0200	U	0.0876	0.0876	0.200	0.0445	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Lead-210	-0.155	U	1.92	1.92		1.58	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Lead-212	0.838		0.125	0.166		0.0584	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Lead-214	0.741		0.145	0.164		0.0631	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Potassium-40	15.8		1.93	2.52		0.263	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Protactinium-231	-1.05	U	3.65	3.65		2.98	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Radium-226	0.730		0.154	0.172	0.700	0.0468	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Radium-228	0.767		0.284	0.294		0.103	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thallium-208	0.261		0.0761	0.0807		0.0305	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thorium-228	0.838		0.125	0.166		0.0584	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thorium-232	0.767		0.284	0.294		0.103	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thorium-234	0.109	U	0.945	0.945		1.27	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Uranium-235	-0.265	U	0.624	0.624		0.635	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Uranium-238	0.109	U	0.945	0.945		1.27	pCi/g	08/06/18 13:23	08/27/18 04:12	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Client Sample ID: PE2-RSYD4-DC-S017**Lab Sample ID: 160-29929-17**

Date Collected: 07/27/18 14:01

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.828		0.227	0.242		0.0375	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Actinium-227	-0.453	U	1.11	1.11		0.894	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Bismuth-212	0.423	U	1.41	1.41		1.13	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Bismuth-214	0.795		0.178	0.195		0.0585	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Cesium-137	0.0140	U	0.0757	0.0758	0.0700	0.0611	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Cobalt-60	-0.0843	U	0.119	0.119	0.200	0.0775	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Lead-210	1.72		1.52	1.54		1.06	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Lead-212	0.656		0.159	0.173		0.0765	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Lead-214	0.506		0.206	0.212		0.143	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Potassium-40	11.1		1.74	2.07		0.415	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Protactinium-231	0.000	U	0.341	0.341		3.19	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Radium-226	0.795		0.178	0.195	0.700	0.0585	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Radium-228	0.828		0.227	0.242		0.0375	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thallium-208	0.216		0.0819	0.0848		0.0341	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thorium-228	0.656		0.159	0.173		0.0765	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thorium-232	0.828		0.227	0.242		0.0375	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Thorium-234	0.0340	U	1.79	1.79		1.47	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Uranium-235	-0.260	U	0.776	0.776		0.633	pCi/g	08/06/18 13:23	08/27/18 04:12	1
Uranium-238	0.0340	U	1.79	1.79		1.47	pCi/g	08/06/18 13:23	08/27/18 04:12	1

Client Sample ID: PE2-RSYD4-DC-S018**Lab Sample ID: 160-29929-18**

Date Collected: 07/27/18 14:06

Matrix: Solid

Date Received: 08/02/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.737		0.225	0.237		0.0424	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Actinium-227	-0.323	U	0.840	0.841		0.568	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Bismuth-212	0.000	U	0.694	0.694		0.933	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Bismuth-214	0.734		0.161	0.178		0.0338	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Cesium-137	0.0239	U	0.0809	0.0809	0.0700	0.0641	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Cobalt-60	0.0178	U	0.0633	0.0634	0.200	0.0391	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Lead-210	0.771	U	1.63	1.64		1.12	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Lead-212	0.558		0.118	0.138		0.0580	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Lead-214	0.698		0.154	0.171		0.0486	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Potassium-40	9.48		1.72	1.98		0.347	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Protactinium-231	0.000	U	0.619	0.619		2.37	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Radium-226	0.734		0.161	0.178	0.700	0.0338	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Radium-228	0.737		0.225	0.237		0.0424	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Thallium-208	0.179		0.0639	0.0666		0.0208	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Thorium-228	0.558		0.118	0.138		0.0580	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Thorium-232	0.737		0.225	0.237		0.0424	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Thorium-234	0.199	U	0.236	0.237		1.12	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Uranium-235	-0.0112	U	0.313	0.313		0.317	pCi/g	08/06/18 13:23	08/27/18 04:13	1
Uranium-238	0.199	U	0.236	0.237		1.12	pCi/g	08/06/18 13:23	08/27/18 04:13	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-380968/22-A

Matrix: Solid

Analysis Batch: 384724

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 380968

Analyte	MB Result	MB Qualifier	Count (2σ+/-)	Total (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.02050	U	0.0574	0.0574	0.331	0.0492	pCi/g	08/07/18 18:44	08/23/18 06:02	1

Carrier	%Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	81.9		40 - 110	08/07/18 18:44	08/23/18 06:02	1

Lab Sample ID: LCS 160-380968/1-A

Matrix: Solid

Analysis Batch: 384726

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 380968

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
Total Beta Strontium	8.20	7.829		0.640	0.331	0.0503	pCi/g	95	75 - 125

Carrier	%Yield	LCS Qualifier	Limits
Sr Carrier	83.0		40 - 110

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-380669/1-A

Matrix: Solid

Analysis Batch: 385323

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 380669

Analyte	MB Result	MB Qualifier	Count (2σ+/-)	Total (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	-0.08769	U	0.289	0.289		0.153	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Actinium-227	0.4423		0.379	0.382		0.216	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Bismuth-212	0.3182	U	0.928	0.929		0.732	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Bismuth-214	0.0005804	U	0.000474	0.000478		0.151	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Cesium-137	0.02086	U	0.0546	0.0546	0.0700	0.0419	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Cobalt-60	-0.002316	U	0.0734	0.0734	0.200	0.0374	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Lead-210	0.9110		1.19	1.19		0.810	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Lead-212	-0.003219	U	0.0790	0.0790		0.0651	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Lead-214	0.004398	U	0.105	0.105		0.0851	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Potassium-40	-0.3794	U	0.872	0.873		0.502	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Protactinium-231	0.0000	U	0.415	0.415		1.69	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Radium-226	0.0005804	U	0.000474	0.000478	0.700	0.151	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Radium-228	-0.08769	U	0.289	0.289		0.153	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Thallium-208	0.01449	U	0.0110	0.0111		0.0348	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Thorium-228	-0.003219	U	0.0790	0.0790		0.0651	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Thorium-232	-0.08769	U	0.289	0.289		0.153	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Thorium-234	-0.4079	U	0.918	0.919		0.780	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Uranium-235	0.06648	U	0.217	0.217		0.216	pCi/g	08/06/18 13:23	08/27/18 02:51	1
Uranium-238	-0.4079	U	0.918	0.919		0.780	pCi/g	08/06/18 13:23	08/27/18 02:51	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-380669/2-A

Matrix: Solid

Analysis Batch: 385321

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 380669

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec.	Limits
		Result	Qual		LOQ	DLC		
Americium-241	96.8	99.07		11.7		0.617	pCi/g	102 87 - 116
Cesium-137	28.2	30.16		3.17	0.0700	0.137	pCi/g	107 87 - 120
Cobalt-60	12.8	13.73		1.43	0.200	0.0825	pCi/g	107 87 - 115

Lab Sample ID: 160-29929-1 DU

Matrix: Solid

Analysis Batch: 385324

Client Sample ID: PE2-RSYD4-DC-S001

Prep Type: Total/NA

Prep Batch: 380669

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total		RER	Limit		
					Uncert. (2σ+/-)	LOQ	DLC	Unit		
Actinium 228	0.766		0.5489		0.360		0.164	pCi/g	0.31	1
Actinium-227	0.243	U	0.3827	U	0.847		0.682	pCi/g	0.10	1
Bismuth-212	0.444	U	0.5864	U	1.13		0.887	pCi/g	0.07	1
Bismuth-214	0.927		0.7460		0.217		0.0762	pCi/g	0.41	1
Cesium-137	0.0215	U	-0.02996	U	0.153	0.0700	0.0650	pCi/g	0.22	1
Cobalt-60	0.0130	U	-0.09840	U	0.128	0.200	0.0759	pCi/g	0.45	1
Lead-210	-0.112	U	-1.701	U	1.47		1.79	pCi/g	0.52	1
Lead-212	0.804		0.6581		0.147		0.0636	pCi/g	0.46	1
Lead-214	0.772		0.8687		0.184		0.0554	pCi/g	0.29	1
Potassium-40	17.0		17.99		2.77		0.265	pCi/g	0.17	1
Protactinium-231	-0.304	U	-1.056	U	3.76		3.07	pCi/g	0.11	1
Radium-226	0.927		0.7460		0.217	0.700	0.0762	pCi/g	0.41	1
Radium-228	0.766		0.5489		0.360		0.164	pCi/g	0.31	1
Thallium-208	0.324		0.3095		0.0902		0.0331	pCi/g	0.08	1
Thorium-228	0.804		0.6581		0.147		0.0636	pCi/g	0.46	1
Thorium-232	0.766		0.5489		0.360		0.164	pCi/g	0.31	1
Thorium-234	0.847		0.02443	U	1.76		1.45	pCi/g	0.31	1
Uranium-235	-0.169	U	0.1107	U	0.257		0.557	pCi/g	0.47	1
Uranium-238	0.847		0.02443	U	1.76		1.45	pCi/g	0.31	1

QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Rad**Leach Batch: 379958**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29929-1	PE2-RSYD4-DC-S001	Total/NA	Solid	Dry and Grind	5
160-29929-2	PE2-RSYD4-DC-S002	Total/NA	Solid	Dry and Grind	5
160-29929-3	PE2-RSYD4-DC-S003	Total/NA	Solid	Dry and Grind	5
160-29929-4	PE2-RSYD4-DC-S004	Total/NA	Solid	Dry and Grind	5
160-29929-5	PE2-RSYD4-DC-S005	Total/NA	Solid	Dry and Grind	5
160-29929-6	PE2-RSYD4-DC-S006	Total/NA	Solid	Dry and Grind	5
160-29929-7	PE2-RSYD4-DC-S007	Total/NA	Solid	Dry and Grind	5
160-29929-8	PE2-RSYD4-DC-S008	Total/NA	Solid	Dry and Grind	5
160-29929-9	PE2-RSYD4-DC-S009	Total/NA	Solid	Dry and Grind	5
160-29929-10	PE2-RSYD4-DC-S010	Total/NA	Solid	Dry and Grind	5
160-29929-11	PE2-RSYD4-DC-S011	Total/NA	Solid	Dry and Grind	5
160-29929-12	PE2-RSYD4-DC-S012	Total/NA	Solid	Dry and Grind	5
160-29929-13	PE2-RSYD4-DC-S013	Total/NA	Solid	Dry and Grind	5
160-29929-14	PE2-RSYD4-DC-S014	Total/NA	Solid	Dry and Grind	5
160-29929-15	PE2-RSYD4-DC-S015	Total/NA	Solid	Dry and Grind	5
160-29929-16	PE2-RSYD4-DC-S016	Total/NA	Solid	Dry and Grind	5
160-29929-17	PE2-RSYD4-DC-S017	Total/NA	Solid	Dry and Grind	5
160-29929-18	PE2-RSYD4-DC-S018	Total/NA	Solid	Dry and Grind	5
160-29929-1 DU	PE2-RSYD4-DC-S001	Total/NA	Solid	Dry and Grind	5

Prep Batch: 380669

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29929-1	PE2-RSYD4-DC-S001	Total/NA	Solid	Fill_Geo-21	379958
160-29929-2	PE2-RSYD4-DC-S002	Total/NA	Solid	Fill_Geo-21	379958
160-29929-3	PE2-RSYD4-DC-S003	Total/NA	Solid	Fill_Geo-21	379958
160-29929-4	PE2-RSYD4-DC-S004	Total/NA	Solid	Fill_Geo-21	379958
160-29929-5	PE2-RSYD4-DC-S005	Total/NA	Solid	Fill_Geo-21	379958
160-29929-6	PE2-RSYD4-DC-S006	Total/NA	Solid	Fill_Geo-21	379958
160-29929-7	PE2-RSYD4-DC-S007	Total/NA	Solid	Fill_Geo-21	379958
160-29929-8	PE2-RSYD4-DC-S008	Total/NA	Solid	Fill_Geo-21	379958
160-29929-9	PE2-RSYD4-DC-S009	Total/NA	Solid	Fill_Geo-21	379958
160-29929-10	PE2-RSYD4-DC-S010	Total/NA	Solid	Fill_Geo-21	379958
160-29929-11	PE2-RSYD4-DC-S011	Total/NA	Solid	Fill_Geo-21	379958
160-29929-12	PE2-RSYD4-DC-S012	Total/NA	Solid	Fill_Geo-21	379958
160-29929-13	PE2-RSYD4-DC-S013	Total/NA	Solid	Fill_Geo-21	379958
160-29929-14	PE2-RSYD4-DC-S014	Total/NA	Solid	Fill_Geo-21	379958
160-29929-15	PE2-RSYD4-DC-S015	Total/NA	Solid	Fill_Geo-21	379958
160-29929-16	PE2-RSYD4-DC-S016	Total/NA	Solid	Fill_Geo-21	379958
160-29929-17	PE2-RSYD4-DC-S017	Total/NA	Solid	Fill_Geo-21	379958
160-29929-18	PE2-RSYD4-DC-S018	Total/NA	Solid	Fill_Geo-21	379958
MB 160-380669/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-380669/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29929-1 DU	PE2-RSYD4-DC-S001	Total/NA	Solid	Fill_Geo-21	379958

Prep Batch: 380968

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29929-1	PE2-RSYD4-DC-S001	Total/NA	Solid	DPS-0	379958
160-29929-11	PE2-RSYD4-DC-S011	Total/NA	Solid	DPS-0	379958
MB 160-380968/22-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-380968/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29929-2

Method: 905.0 - Total Beta Strontium (GFPC)**Matrix: Solid****Prep Type: Total/NA****Percent Yield (Acceptance Limits)**

Lab Sample ID	Client Sample ID	Sr Carrier (40-110)
160-29929-1	PE2-RSYD4-DC-S001	87.9
160-29929-11	PE2-RSYD4-DC-S011	87.2
LCS 160-380968/1-A	Lab Control Sample	83.0
MB 160-380968/22-A	Method Blank	81.9

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30225-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
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Attn: Eddie Kalombo

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Optim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Job ID: 160-30225-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Optim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30225-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Method 3665A: Sulfuric Acid/Permanganate Cleanup

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Job ID: 160-30225-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 08/17/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0° C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYD4-DC-B-S001 (160-30225-1), PE2-RSYD4-DC-B-S002 (160-30225-2), PE2-RSYD4-DC-B-S003 (160-30225-3), PE2-RSYD4-DC-B-S004 (160-30225-4), PE2-RSYD4-DC-B-S005 (160-30225-5), PE2-RSYD4-DC-B-S006 (160-30225-6), PE2-RSYD4-DC-B-S007 (160-30225-7) and PE2-RSYD4-DC-B-S008 (160-30225-8) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/17/2018, prepared on 08/20/2018 and analyzed on 09/10/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met for samples PE2-RSYD4-DC-B-S004 (160-30225-4), PE2-RSYD4-DC-B-S005 (160-30225-5) and PE2-RSYD4-DC-B-S006 (160-30225-6) in batch 160-384040. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30225-2

Login Number: 30225**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation

These commonly used abbreviations may or may not be present in this report.

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30225-1	PE2-RSYD4-DC-B-S001	Solid	08/09/18 09:35	08/17/18 08:30
160-30225-2	PE2-RSYD4-DC-B-S002	Solid	08/09/18 09:42	08/17/18 08:30
160-30225-3	PE2-RSYD4-DC-B-S003	Solid	08/09/18 09:49	08/17/18 08:30
160-30225-4	PE2-RSYD4-DC-B-S004	Solid	08/09/18 09:56	08/17/18 08:30
160-30225-5	PE2-RSYD4-DC-B-S005	Solid	08/09/18 10:03	08/17/18 08:30
160-30225-6	PE2-RSYD4-DC-B-S006	Solid	08/09/18 10:10	08/17/18 08:30
160-30225-7	PE2-RSYD4-DC-B-S007	Solid	08/09/18 10:17	08/17/18 08:30
160-30225-8	PE2-RSYD4-DC-B-S008	Solid	08/09/18 10:25	08/17/18 08:30

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Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Client Sample ID: PE2-RSYD4-DC-B-S001

Date Collected: 08/09/18 09:35

Date Received: 08/17/18 08:30

Lab Sample ID: 160-30225-1

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	1.16		0.255	0.281		0.0339	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Actinium-227	0.231	U	0.521	0.522		0.444	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Bismuth-212	0.348	U	0.996	0.997		0.792	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Bismuth-214	0.741		0.182	0.197		0.0650	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Cesium-137	0.000	U	0.0247	0.0247	0.0700	0.0546	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Cobalt-60	0.0346		0.0693	0.0693	0.200	0.0318	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Lead-210	-0.931	U	2.18	2.19		1.83	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Lead-212	0.752		0.131	0.153		0.0671	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Lead-214	0.692		0.161	0.175		0.0778	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Potassium-40	18.6		2.11	2.83		0.375	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Protactinium-231	0.000	U	0.398	0.398		3.03	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Radium-226	0.741		0.182	0.197	0.700	0.0650	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Radium-228	1.16		0.255	0.281		0.0339	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Thallium-208	0.347		0.0860	0.0930		0.0292	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Thorium-228	0.752		0.131	0.153		0.0671	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Thorium-232	1.16		0.255	0.281		0.0339	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Thorium-234	0.611	U	0.438	0.443		1.44	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Uranium-235	0.150	U	0.327	0.327		0.642	pCi/g	08/20/18 13:10	09/10/18 03:33	1
Uranium-238	0.611	U	0.438	0.443		1.44	pCi/g	08/20/18 13:10	09/10/18 03:33	1

Client Sample ID: PE2-RSYD4-DC-B-S002

Date Collected: 08/09/18 09:42

Date Received: 08/17/18 08:30

Lab Sample ID: 160-30225-2

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.708		0.217	0.229		0.0545	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Actinium-227	0.145	U	0.339	0.339		0.363	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Bismuth-212	-0.446	U	0.861	0.863		0.822	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Bismuth-214	0.690		0.142	0.159		0.0462	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Cesium-137	0.000611	U	0.0678	0.0678	0.0700	0.0387	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Cobalt-60	-0.0355	U	0.105	0.105	0.200	0.0521	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Lead-210	-0.0391	U	1.53	1.53		1.08	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Lead-212	0.725		0.117	0.150		0.0604	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Lead-214	0.740		0.129	0.150		0.0609	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Potassium-40	16.4		1.81	2.47		0.220	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Protactinium-231	0.000	U	0.596	0.596		2.27	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Radium-226	0.690		0.142	0.159	0.700	0.0462	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Radium-228	0.708		0.217	0.229		0.0545	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thallium-208	0.287		0.0698	0.0759		0.0236	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thorium-228	0.725		0.117	0.150		0.0604	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thorium-232	0.708		0.217	0.229		0.0545	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thorium-234	-0.385	U	0.639	0.640		0.914	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Uranium-235	0.0115	U	0.114	0.114		0.306	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Uranium-238	-0.385	U	0.639	0.640		0.914	pCi/g	08/20/18 13:10	09/10/18 06:18	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Client Sample ID: PE2-RSYD4-DC-B-S003**Lab Sample ID: 160-30225-3**

Date Collected: 08/09/18 09:49

Matrix: Solid

Date Received: 08/17/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.05		0.230	0.254		0.0719	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Actinium-227	0.206	U	0.220	0.222		0.377	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Bismuth-212	0.363	U	0.788	0.789		0.615	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Bismuth-214	0.843		0.182	0.202		0.0591	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Cesium-137	0.0184	U	0.0843	0.0843	0.0700	0.0681	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Cobalt-60	-0.0137	U	0.120	0.120	0.200	0.0440	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Lead-210	0.595	U	1.21	1.21		0.958	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Lead-212	0.848		0.126	0.167		0.0593	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Lead-214	0.619		0.140	0.154		0.0541	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Potassium-40	15.1		1.88	2.43		0.260	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Protactinium-231	0.000	U	0.392	0.392		2.64	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Radium-226	0.843		0.182	0.202	0.700	0.0591	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Radium-228	1.05		0.230	0.254		0.0719	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thallium-208	0.267		0.0799	0.0845		0.0272	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thorium-228	0.848		0.126	0.167		0.0593	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thorium-232	1.05		0.230	0.254		0.0719	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thorium-234	-0.840	U	0.770	0.775		1.27	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Uranium-235	-0.217	U	0.403	0.404		0.432	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Uranium-238	-0.840	U	0.770	0.775		1.27	pCi/g	08/20/18 13:10	09/10/18 06:20	1

Client Sample ID: PE2-RSYD4-DC-B-S004**Lab Sample ID: 160-30225-4**

Date Collected: 08/09/18 09:56

Matrix: Solid

Date Received: 08/17/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.01		0.322	0.337		0.104	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Actinium-227	0.225	U	0.534	0.535		0.450	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Bismuth-212	-0.746	U	2.11	2.11		1.07	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Bismuth-214	0.775		0.203	0.218		0.0849	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Cesium-137	-0.00814	U	0.0957	0.0957	0.0700	0.0782	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Cobalt-60	0.00276	U	0.0934	0.0934	0.200	0.0464	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Lead-210	1.41		1.85	1.86		1.22	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Lead-212	0.824		0.143	0.167		0.0751	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Lead-214	0.752		0.170	0.187		0.0663	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Potassium-40	16.8		2.05	2.66		0.391	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Protactinium-231	0.000	U	0.850	0.850		3.15	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Radium-226	0.775		0.203	0.218	0.700	0.0849	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Radium-228	1.01		0.322	0.337		0.104	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thallium-208	0.300		0.0976	0.102		0.0395	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thorium-228	0.824		0.143	0.167		0.0751	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thorium-232	1.01		0.322	0.337		0.104	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Thorium-234	0.385	U	0.746	0.747		0.594	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Uranium-235	0.137	U	0.290	0.290		0.634	pCi/g	08/20/18 13:10	09/10/18 06:18	1
Uranium-238	0.385	U	0.746	0.747		0.594	pCi/g	08/20/18 13:10	09/10/18 06:18	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Client Sample ID: PE2-RSYD4-DC-B-S005

Date Collected: 08/09/18 10:03

Date Received: 08/17/18 08:30

Lab Sample ID: 160-30225-5

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.05		0.293	0.312		0.0758	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Actinium-227	0.284	U	0.593	0.594		0.393	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Bismuth-212	0.795	U	1.54	1.54		1.23	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Bismuth-214	0.495		0.136	0.146		0.0642	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Cesium-137	-0.0857	U	0.0834	0.0838	0.0700	0.0848	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Cobalt-60	-0.0214	U	0.0713	0.0714	0.200	0.0483	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Lead-210	-0.837	U	1.35	1.36		1.50	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Lead-212	0.805		0.115	0.155		0.0461	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Lead-214	0.679		0.130	0.148		0.0570	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Potassium-40	17.8		2.03	2.73		0.258	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Protactinium-231	0.441	U	1.62	1.62		2.56	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Radium-226	0.495		0.136	0.146	0.700	0.0642	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Radium-228	1.05		0.293	0.312		0.0758	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thallium-208	0.308		0.0786	0.0848		0.0267	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thorium-228	0.805		0.115	0.155		0.0461	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thorium-232	1.05		0.293	0.312		0.0758	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Thorium-234	0.510	U	0.654	0.656		0.514	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Uranium-235	0.170	U	0.215	0.216		0.473	pCi/g	08/20/18 13:10	09/10/18 06:20	1
Uranium-238	0.510	U	0.654	0.656		0.514	pCi/g	08/20/18 13:10	09/10/18 06:20	1

Client Sample ID: PE2-RSYD4-DC-B-S006

Date Collected: 08/09/18 10:10

Date Received: 08/17/18 08:30

Lab Sample ID: 160-30225-6

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.899		0.212	0.231		0.0882	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Actinium-227	-0.0741	U	0.662	0.662		0.409	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Bismuth-212	0.295	U	0.963	0.963		0.768	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Bismuth-214	0.685		0.159	0.174		0.0462	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Cesium-137	0.000379	U	0.0976	0.0976	0.0700	0.0803	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Cobalt-60	0.0277	U	0.0517	0.0518	0.200	0.0332	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Lead-210	0.924		1.23	1.24		0.810	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Lead-212	0.785		0.121	0.158		0.0526	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Lead-214	0.605		0.167	0.178		0.0717	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Potassium-40	15.9		2.02	2.59		0.295	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Protactinium-231	0.681	U	2.06	2.07		2.26	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Radium-226	0.685		0.159	0.174	0.700	0.0462	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Radium-228	0.899		0.212	0.231		0.0882	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Thallium-208	0.231		0.0881	0.0913		0.0347	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Thorium-228	0.785		0.121	0.158		0.0526	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Thorium-232	0.899		0.212	0.231		0.0882	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Thorium-234	0.0643	U	0.520	0.520		0.888	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Uranium-235	0.228	U	0.339	0.340		0.318	pCi/g	08/20/18 13:10	09/10/18 06:19	1
Uranium-238	0.0643	U	0.520	0.520		0.888	pCi/g	08/20/18 13:10	09/10/18 06:19	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Client Sample ID: PE2-RSYD4-DC-B-S007

Date Collected: 08/09/18 10:17

Date Received: 08/17/18 08:30

Lab Sample ID: 160-30225-7

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.669		0.218	0.228		0.144	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Actinium-227	0.354		0.514	0.516		0.352	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Bismuth-212	-0.320	U	0.634	0.635		0.825	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Bismuth-214	0.647		0.149	0.164		0.0511	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Cesium-137	0.0110	U	0.0518	0.0519	0.0700	0.0412	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Cobalt-60	0.0146	U	0.0987	0.0987	0.200	0.0524	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Lead-210	-0.935	U	1.34	1.35		1.32	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Lead-212	0.676		0.107	0.138		0.0499	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Lead-214	0.599		0.127	0.141		0.0486	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Potassium-40	13.9		1.73	2.24		0.238	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Protactinium-231	0.000	U	0.419	0.419		2.35	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Radium-226	0.647		0.149	0.164	0.700	0.0511	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Radium-228	0.669		0.218	0.228		0.144	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thallium-208	0.211		0.0649	0.0685		0.0251	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thorium-228	0.676		0.107	0.138		0.0499	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thorium-232	0.669		0.218	0.228		0.144	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thorium-234	0.652		0.505	0.510		0.454	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Uranium-235	-0.234	U	0.323	0.324		0.433	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Uranium-238	0.652		0.505	0.510		0.454	pCi/g	08/20/18 13:10	09/10/18 07:01	1

Client Sample ID: PE2-RSYD4-DC-B-S008

Date Collected: 08/09/18 10:25

Date Received: 08/17/18 08:30

Lab Sample ID: 160-30225-8

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	1.09		0.206	0.234		0.0378	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Actinium-227	0.622		0.670	0.674		0.389	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Bismuth-212	0.624	U	1.24	1.24		0.978	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Bismuth-214	0.725		0.166	0.182		0.0464	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Cesium-137	0.0260	U	0.0852	0.0852	0.0700	0.0679	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Cobalt-60	0.0420		0.0755	0.0757	0.200	0.0348	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Lead-210	-0.346	U	1.64	1.64		1.17	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Lead-212	0.860		0.127	0.169		0.0511	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Lead-214	0.788		0.162	0.181		0.0733	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Potassium-40	15.6		2.06	2.60		0.309	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Protactinium-231	0.683	U	2.54	2.54		2.66	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Radium-226	0.725		0.166	0.182	0.700	0.0464	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Radium-228	1.09		0.206	0.234		0.0378	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thallium-208	0.349		0.0861	0.0934		0.0242	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thorium-228	0.860		0.127	0.169		0.0511	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thorium-232	1.09		0.206	0.234		0.0378	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Thorium-234	0.854		0.564	0.572		0.471	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Uranium-235	-0.0100	U	0.444	0.444		0.349	pCi/g	08/20/18 13:10	09/10/18 07:01	1
Uranium-238	0.854		0.564	0.572		0.471	pCi/g	08/20/18 13:10	09/10/18 07:01	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**Lab Sample ID: MB 160-384040/1-A****Matrix: Solid****Analysis Batch: 388145****Client Sample ID: Method Blank****Prep Type: Total/NA****Prep Batch: 384040**

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.02758	U	0.132	0.132		0.0924	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Actinium-227	0.1355	U	0.179	0.180		0.167	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Bismuth-212	0.1351	U	0.842	0.842		0.683	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Bismuth-214	-0.05333	U	0.142	0.142		0.129	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Cesium-137	0.0005573	U	0.0282	0.0282	0.0700	0.0232	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Cobalt-60	0.0000	U	0.0196	0.0196	0.200	0.0114	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Lead-210	0.3773	U	0.982	0.983		0.777	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Lead-212	0.01696	U	0.0734	0.0735		0.0590	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Lead-214	-0.09421	U	0.105	0.105		0.0804	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Potassium-40	-0.3528	U	0.683	0.684		0.505	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Protactinium-231	0.3685	U	1.04	1.05		1.15	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Radium-226	-0.05333	U	0.142	0.142	0.700	0.129	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Radium-228	0.02758	U	0.132	0.132		0.0924	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Thallium-208	0.02155	U	0.0203	0.0204		0.0258	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Thorium-228	0.01696	U	0.0734	0.0735		0.0590	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Thorium-232	0.02758	U	0.132	0.132		0.0924	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Thorium-234	-0.0007712	U	0.00193	0.00193		0.473	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Uranium-235	-0.002364	U	0.189	0.189		0.262	pCi/g	08/20/18 13:10	09/10/18 11:13	1
Uranium-238	-0.0007712	U	0.00193	0.00193		0.473	pCi/g	08/20/18 13:10	09/10/18 11:13	1

Lab Sample ID: LCS 160-384040/2-A**Matrix: Solid****Analysis Batch: 388145****Client Sample ID: Lab Control Sample****Prep Type: Total/NA****Prep Batch: 384040**

Analyte	Spike	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	Limits
	Added	Result	Qual	Uncert. (2σ+/-)					
Americium-241	96.8	94.44		9.92		0.532	pCi/g	98	87 - 116
Cesium-137	28.2	26.97		2.87	0.0700	0.0879	pCi/g	96	87 - 120
Cobalt-60	12.7	11.99		1.25	0.200	0.0242	pCi/g	94	87 - 115

Lab Sample ID: 160-30225-1 DU**Matrix: Solid****Analysis Batch: 388144****Client Sample ID: PE2-RSYD4-DC-B-S001****Prep Type: Total/NA****Prep Batch: 384040**

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Actinium 228	1.16		0.9695		0.208		0.0288	pCi/g	0.39	1
Actinium-227	0.231	U	0.2194	U	0.621		0.378	pCi/g	0.01	1
Bismuth-212	0.348	U	0.04038	U	0.859		0.704	pCi/g	0.17	1
Bismuth-214	0.741		0.7579		0.215		0.0700	pCi/g	0.04	1
Cesium-137	0.000	U	-0.04780	U	0.0810	0.0700	0.0633	pCi/g	0.45	1
Cobalt-60	0.0346		0.01403	U	0.0239	0.200	0.0528	pCi/g	0.22	1
Lead-210	-0.931	U	1.165	U	1.87		1.19	pCi/g	0.52	1
Lead-212	0.752		0.7536		0.147		0.0651	pCi/g	0.01	1
Lead-214	0.692		0.7028		0.154		0.0571	pCi/g	0.03	1
Potassium-40	18.6		18.30		2.69		0.262	pCi/g	0.06	1
Protactinium-231	0.000	U	0.0000	U	0.310		2.77	pCi/g	0	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-30225-1 DU

Client Sample ID: PE2-RSYD4-DC-B-S001

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 388144

Prep Batch: 384040

Analyte	Sample	Sample	DU		DU		Total		RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Radium-226	0.741		0.7579		0.215	0.700	0.0700	pCi/g	0.04	1
Radium-228	1.16		0.9695		0.208		0.0288	pCi/g	0.39	1
Thallium-208	0.347		0.3448		0.0946		0.0313	pCi/g	0.01	1
Thorium-228	0.752		0.7536		0.147		0.0651	pCi/g	0.01	1
Thorium-232	1.16		0.9695		0.208		0.0288	pCi/g	0.39	1
Thorium-234	0.611 U		-0.1193 U		1.23		1.01	pCi/g	0.44	1
Uranium-235	0.150 U		0.2809 U		0.271		0.545	pCi/g	0.22	1
Uranium-238	0.611 U		-0.1193 U		1.23		1.01	pCi/g	0.44	1

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QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30225-2

Rad

Leach Batch: 383231

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30225-1	PE2-RSYD4-DC-B-S001	Total/NA	Solid	Dry and Grind	
160-30225-2	PE2-RSYD4-DC-B-S002	Total/NA	Solid	Dry and Grind	
160-30225-3	PE2-RSYD4-DC-B-S003	Total/NA	Solid	Dry and Grind	
160-30225-4	PE2-RSYD4-DC-B-S004	Total/NA	Solid	Dry and Grind	
160-30225-5	PE2-RSYD4-DC-B-S005	Total/NA	Solid	Dry and Grind	
160-30225-6	PE2-RSYD4-DC-B-S006	Total/NA	Solid	Dry and Grind	
160-30225-7	PE2-RSYD4-DC-B-S007	Total/NA	Solid	Dry and Grind	
160-30225-8	PE2-RSYD4-DC-B-S008	Total/NA	Solid	Dry and Grind	
160-30225-1 DU	PE2-RSYD4-DC-B-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 384040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30225-1	PE2-RSYD4-DC-B-S001	Total/NA	Solid	Fill_Geo-21	383231
160-30225-2	PE2-RSYD4-DC-B-S002	Total/NA	Solid	Fill_Geo-21	383231
160-30225-3	PE2-RSYD4-DC-B-S003	Total/NA	Solid	Fill_Geo-21	383231
160-30225-4	PE2-RSYD4-DC-B-S004	Total/NA	Solid	Fill_Geo-21	383231
160-30225-5	PE2-RSYD4-DC-B-S005	Total/NA	Solid	Fill_Geo-21	383231
160-30225-6	PE2-RSYD4-DC-B-S006	Total/NA	Solid	Fill_Geo-21	383231
160-30225-7	PE2-RSYD4-DC-B-S007	Total/NA	Solid	Fill_Geo-21	383231
160-30225-8	PE2-RSYD4-DC-B-S008	Total/NA	Solid	Fill_Geo-21	383231
MB 160-384040/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-384040/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-30225-1 DU	PE2-RSYD4-DC-B-S001	Total/NA	Solid	Fill_Geo-21	383231